MISSOURI
DEPARTMENT OF
NATURAL RESOURCES

Air Pollution Control Program

Missouri Air Monitoring Network Assessment 2020

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Executive Summary

Introduction

Each monitoring agency is required (40 CFR**)** 58.10 (d)) to perform and submit to the Environmental Protection Agency (EPA) an assessment of the air quality monitoring network every five years to determine whether the network meets the monitoring objectives defined in 40 CFR 58 Appendix D, whether new sites are needed, whether existing sites are no longer needed, and whether new technologies are appropriate for incorporation into the monitoring network. The first required assessment was completed in 2010, and the second assessment was completed in 2015. This report presents the results of the 2020 assessment for Missouri. This assessment follows EPA Region 7 guidance. Recent changes or proposed changes in the National Ambient Air Quality Standards (NAAQS) must be considered in assessing the air quality monitoring network.

The assessment discusses Missouri population, climate and new emission sources that are used to evaluate the network for monitoring of each of the following air pollutants: carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), particulate matter smaller than 10 micrometers (PM_{10}), ozone (O_3), particulate matter smaller than 2.5 micrometers ($PM_{2.5}$) and lead. This Executive Summary concludes with a table characterizing current monitoring sites as critical, credible or marginal for each pollutant.

Population

The assessment includes consideration of population distribution, since one of the goals of an air monitoring network is to assess population exposure. Also, some air pollutant emissions, especially from area and mobile sources, are associated with population. The 2010 population of Missouri was 6 million, an increase of 7% from the 2000 population. The 2019 estimated population was estimated to be 6.1 million, an increase of about 2% from the 2010 population. Missouri includes dominant population centers in the St. Louis and Kansas City areas, with the southwestern region (including Springfield and Joplin) also an area of some significance in population. The 2010 populations of the three largest metropolitan statistical areas (MSA) in Missouri were:

- St. Louis MSA (Missouri portion): 2.1 million
- Kansas City MSA (Missouri portion): 1.2 million
- Springfield MSA: 0.4 million

The largest recent and expected future growth in population is generally in suburban areas surrounding the St. Louis and Kansas City areas, not in the urban centers. Population growth also continues in the Springfield, Branson, Columbia and Fort Leonard Wood areas.

Climate

Missouri is located in the middle of the North American continent and, therefore, normally experiences four full seasons, with extremes in temperature from 100 degrees Fahrenheit (°F) or greater to below 0°F. The typical duration and dominant climatology of the four seasons is:

- Spring: March to May, the wettest season, variable winds, temperature 76°F to 33°F.
- Summer: June to August, warm moist air from the Gulf of Mexico, wind generally from the south, temperature 90°F to 62°F.
- Fall: September to November, wind generally from the south shifting to the northwest late in the season, temperature 81°F to 33°F.
- Winter: December to February, wind generally from the northwest, temperature 46°F to 18°F.

Ozone episodes generally occur in the summer when high pressure moves to the east of Missouri along with an upper level ridge over the area. High temperature, abundant sunshine, and light winds are characteristic of such episodes and contribute to the formation and accumulation of ozone. $PM_{2.5}$ levels, especially in the St. Louis area, are affected by regional weather patterns that bring air masses into Missouri from areas with emissions of $PM_{2.5}$ precursors. For example, summertime high pressure systems are often centered over the Ohio River Valley area, which not only bring air masses from that SO_2 emissions-rich region into the St. Louis area, but also create local stagnant or nearly stagnant conditions that allow accumulation of both regional and locally-generated air contaminants.

New Emission Sources

New large point emission sources are primarily those permitted under the Prevention of Significant Deterioration (PSD) program. Increases in emissions of nitrogen oxides (NO_X), CO and volatile organic compounds (VOCs), at PSD review facilities do not appear to be significant enough to require additional monitoring of these pollutants. NO_X and VOC emissions do, however, contribute to ozone formation. Locations of these sources must be considered in ongoing evaluation of potential ozone monitoring locations, especially if ozone standards are made more stringent in the future.

Carbon Monoxide

The primary NAAQS for CO are 35 parts per million (ppm) for one hour, and 9 ppm for eight hours. These concentrations must not be exceeded more than once per year. CO monitoring is required at the Blair Street NCore site and at the two initial near-roadway sites in the St. Louis and Kansas City areas (Forest Park and Blue Ridge I-70). CO is currently monitored at these three sites in Missouri. None of these sites reported a violation of the NAAQS in recent years.

CO is primarily emitted as a component of motor vehicle exhaust, so that CO emissions are correlated with vehicle miles, which are highest on major roadways in population centers.

Sulfur Dioxide

The SO_2 primary NAAQS is 75 parts per billion (ppb); the form of the standard is the 3-year average of the 99th percentile of annual daily maximum 1-hour averages. The rule that revised the NAAQS in 2010 includes minimum monitoring requirements based on a combination of population and SO_2 emissions in Core Based Statistical Areas (CBSAs). Three monitoring sites are required in Missouri CBSAs (two in the St. Louis area, one in the Kansas City Area). Each monitoring site may be determined on the basis of one or more of the following criteria: location near known emission sources, location to measure maximum concentrations, location to measure population exposure, location to measure regional transport, or location to measure regional background. The monitoring is to be supplemented by air quality simulation modeling of the impact of known SO_2 sources.

SO_2 is currently monitored by the state at six sites in Missouri, including three sites in the St. Louis area, one in Kansas City, and two in rural areas. SO_2 is also being monitored by utilities and other industrial facilities at 13 sites near emission sources. Most of these industrial sites began operation in 2017 to meet the requirements of the 2015 Data Requirements Rule (DRR). Of these, only two sites in New Madrid County near the Magnitude 7 Metals facility are in violation of the standard based on 2017 through 2019 data. The State of Missouri has recommended designation of an area surrounding that facility as a nonattainment area for the SO_2 NAAQS and recommended that other areas of the state where industrial monitoring has been conducted according to the DRR be designated as attainment/unclassifiable. EPA is expected to act on those recommendation by the end of 2020.

SO_2 is primarily emitted from coal or fuel oil combustion facilities, especially electric generating stations.

The Blair Street site in St. Louis is an NCore site, which requires SO_2 monitoring. The Blair Street site also doubles as a population-oriented site. Three of the current state-operated sites Mott St. in Herculaneum, Troost, and Buick Northeast are source-oriented sites that should be continued.

Nitrogen Dioxide

The NO_2 primary NAAQS is 100 ppb; the form of the standard is the 3-year average of the 99th percentile of annual daily maximum 1-hour averages. There is also an annual average NAAQS of 53 ppb. The rule that revised the NAAQS in 2010 includes minimum monitoring requirements. Two near-road sites are required in the St. Louis area and one in the Kansas City area. A minimum of one population-oriented monitor must be sited in any urban area with

population greater than or equal to 1 million people. Additional monitors are to be sited to monitor exposure to susceptible and vulnerable communities.

NO_2 is currently monitored by the Department at six sites in Missouri, three sites in the St. Louis area (two of which are near road), two in the Kansas City area (one of which is near road), and one in a rural area. None of these sites is in violation of either the annual or 1-hour standard.

Nitrogen oxide (NO_X) is emitted from a variety of source types: point (electricity generating stations and other stationary combustion sources), mobile (motor vehicles), and low level area sources. Some of the larger sources and a concentration of relatively smaller sources are located within the St. Louis, Kansas City and Springfield urban areas. Some large sources are located outside the urban areas, especially along the Missouri and Mississippi rivers. Point source NO_X emissions have generally decreased in recent years, but increased slightly over the last few years. Mobile source NO_X emissions generally correlate with vehicular traffic density and area source emissions generally correlate with population.

The Blair and Troost sites are judged to be critical because they are located in part to evaluate population exposure within the St. Louis and Kansas City urban areas, respectively. The Forest Park, Blue Ridge I-70and Rider Trail sites are also critical because they meet the requirement for near-road monitoring. The Mark Twain State Park site is judged to be credible to critical because it meets the need for measurement of regional background NO_2 concentration.

In addition to these NO_2 monitoring sites, NO_X/NO_Y (NO_Y represents total reactive nitrogen oxides) monitoring is being done as required at the Blair Street NCore site. This monitoring is also critical.

PM_{10}

The PM_{10} NAAQS is a 24-hour average of 150 micrograms per cubic meter ($\mu g/m^3$), not to be exceeded more than once per year. There are minimum monitoring requirements for PM_{10} in each MSA, based on MSA population and the monitored PM_{10} concentrations. A minimum of two to four sites is required to monitor PM_{10} levels in the St. Louis area, the same number in the Kansas City area, and zero to one in the Springfield area.

PM_{10} is currently monitored by the Department at nine sites in Missouri, three sites in the St. Louis area, two sites in the Kansas City area, one site in Springfield, and three sites in other areas. None of these sites has violated the NAAQS in recent years, but the Branch Street site exceeded the level of the NAAQS in 2017, and the Carthage sites exceeded the level of the NAAQS in 2016. These two sites are both located near PM_{10} emission sources.

PM_{10} point sources are concentrated in the St. Louis, Kansas City and Springfield areas. Mobile source PM_{10} emissions generally are related to vehicular traffic density, and area source emissions generally are related to population.

The Blair Street site in St. Louis is an NCore site, which requires PM_{10} monitoring. The Branch Street, Front Street and Carthage sites are source-oriented sites considered to be critical. The St. Joseph Pump Station site has not shown recent exceedances, but has shown high enough concentrations that it should be maintained. The Mark Twain State Park site is considered to be critical as a monitor of regional background concentrations. The Troost site measures lower values, so is considered to be credible to critical in order to maintain monitoring of population exposure in the Kansas City area and to continue evaluation of PM_{10} measurement technology in Kansas City. The Arnold West site is critical as a background site for the St. Louis area. The Hillcrest High School site is critical as the only site in the Springfield area.

Ozone

The ozone primary NAAQS is an 8-hour average of 0.070 ppm (70 ppb), three-year average of fourth highest annual average.

Ozone is currently monitored at 22 sites in Missouri. Seven sites are in the St. Louis area, and five are in the Kansas City area. Ste. Genevieve County and the southeast areas each have one site. Two sites are in Springfield, and there are six sites in other areas of the state.

In the St. Louis area, Orchard Farm, West Alton, Blair Street and Maryland Heights have violated the NAAQS in recent years. Only West Alton, which is generally downwind of the St. Louis metropolitan area, remained in violation of the standard for the most recent three-year period (2017-2019).

In the Kansas City area, all sites were within the standard for the most recent three-year period (2017-2019). Trimble, Watkins Mill, Liberty and Rocky Creek, all located north and downwind of central Kansas City, approached but did not violate the standard in recent years. All of the other ozone sites in Missouri were in attainment of the standard for the most recent three-year period (2017-2019).

Nitrogen oxides (NO_X) and VOC emissions contribute to formation of ozone in the atmosphere. NO_X emissions are discussed above. VOC point source emissions are concentrated in the larger urban areas in Missouri and have shown a decrease in recent years. Area source VOC emissions correlate with population, and mobile source emissions, like those of NO_X, correlate with vehicle miles.

Based on minimum monitoring requirements and measured O_3 levels near and above the standard, all of the current sites are considered to be critical.

$PM_{2.5}$

The level of the $PM_{2.5}$ annual primary standard is 12 $\mu g/m^3$. The level of the annual secondary standard is 15 $\mu g/m^3$. The form of both annual standards is the annual mean averaged over three

years. The level of the 24-hour primary and secondary standards is 35 $\mu g/m^3$. The form of the 24-hour standards is the three-year average of the annual 98^{th} percentile of 24-hour averages. $PM_{2.5}$ is currently monitored at 15 sites in Missouri; including 13 sites for NAAQS compliance determination and two IMPROVE sites. Six sites are in the St. Louis area, and four are in the Kansas City area. One site is in the Springfield area, one is in the St. Joseph area, and one is in a rural area. There are also two $PM_{2.5}$ speciation samplers at Blair Street and Arnold West.

All Missouri monitors meet the annual standard for recent years, and all Missouri monitors also meet the 24-hour standard for all recent periods.

Airborne $PM_{2.5}$ at Missouri sites is dominated by the impact of regional or urban-scale influences (some of which are outside of Missouri) and by the contribution of secondary sources. However, primary $PM_{2.5}$ sources also contribute; identified point sources are generally distributed along the Missouri and Mississippi rivers.

All of the Missouri $PM_{2.5}$ sites are considered to be critical, in part because of specific minimum monitoring requirements.

Lead

The level of the primary NAAQS for airborne lead is 0.15 $\mu g/m^3$, measured as total suspended particulate matter (TSP). The averaging time is rolling three-month averages of monthly averages, evaluated over a three-year period. At a minimum, monitors must be placed in areas potentially impacted by sources of lead emissions greater than or equal to one-half ton per year (tpy).

Lead is currently being monitored by the Department at nine monitoring sites in Missouri: four in the Herculaneum area, one in the old lead belt area, three in the new lead belt area and one near a facility in northwest Missouri. Lead monitoring sites are also operated by industries in some of these areas. Monitors in the Herculaneum area and near the two secondary lead smelters in Missouri have shown violation of the standard in the past. However, the primary smelter in Herculaneum ceased operation; the recent violation at one of the Herculaneum sites resulted from demolition activities. Also, emission controls were installed on one of the secondary smelters, and process configuration changes and emission controls are required at the second secondary smelter.

Identified emission sources that may approach or exceed one-half tpy of lead emissions include the Herculaneum facility, the secondary smelters at Buick and Forest City, and the mine/mill complexes in the New Lead Belt area. Emissions from some of these facilities are changing as a result of discontinuing operation of the primary smelter and installing emission controls or pending process changes at both of the secondary smelters.

Because of monitoring requirements as described above and because of recent violations of the standard, which must be evaluated over at least three years, at some sites, all of the current lead monitoring sites are considered to be critical. Some of the sites can, however, be re-evaluated in

a few years if emissions estimates change and the sites continue to show attainment of the standard.

Summary Tables

Table ES-1 summarizes the assessment of current state air monitoring sites in Missouri for CO, SO_2, NO_2, PM_{10}, O_3, $PM_{2.5}$ and lead. Existing sites are characterized as critical or credible for each pollutant. No sites or pollutants are characterized as marginal, because changes in the network about 2010 eliminated marginal sites or pollutants. The table also includes brief comments generally stating the primary reason for each site.

Table ES-2 lists the industry-operated air monitoring sites in Missouri that provide data reported into the EPA air quality system (AQS) database for either SO_2 or lead. SO_2 sites are either Data Requirements Rule (DRR) sites or other sites operated under a consent agreement in a manner consistent with DRR requirements. Most of the lead sites are required by consent agreements or consent judgments.

Table ES-1. Summary of Monitoring Site Assessments for Current State Sites

	Pollutant							Comments
Site	**CO**	**SO_2**	**NO_2**	**PM_{10}**	**O_3**	**$PM_{2.5}$**	**Lead**	
St. Louis Area								
Blair Street (NCore)*	critical	critical	critical	critical	critical	critical		NCore site, NO_2 population exposure, $PM_{2.5}$ speciation, NATTS, PAMS in 2021
West Alton*					critical			St. Louis area ozone design value
South Broadway						critical		Upwind of central St. Louis
Branch Street				critical		critical		Source oriented
Forest Park	critical		critical			critical		Near-road
Rider Trail I-70		credible	critical					Second near-road; SPM for SO_2
Ladue						critical		High $PM_{2.5}$ removal bias
Maryland Heights*					critical			Near St. Louis area ozone design value
Pacific*					critical			Upwind of central St. Louis
Arnold West				credible	critical	critical		Upwind of central St. Louis, $PM_{2.5}$ speciation
Foley West					critical			Near St. Louis area ozone design value
Orchard Farm*					critical			Near St. Louis area ozone design value
Herculaneum Area								
Sherman**							critical	Source oriented
Dunklin High School**							critical	Source oriented
Mott Street**		critical					critical	Source oriented
Ursuline North							critical	Background for source area
Kansas City Area								
Troost		critical	critical	credible-critical		critical		Required for SO_2 maintenance area
Front Street				critical				Source oriented
Blue Ridge I-70	critical		critical			critical		Near-road
Liberty					critical	critical		At or near KC area ozone design value
Trimble					critical			At or near KC area ozone design value
Watkins Mill					critical			At or near KC area ozone design value
Rocky Creek					critical			At or near KC area ozone design value
Richards Gebaur South					critical	critical		Upwind of central KC area
Springfield Area								
Hillcrest High School				critical	critical	critical		Springfield ozone design value; 2 ozone sites required
Fellows Lake					critical			Springfield ozone design value; 2 ozone sites required
Remainder of State								
Mark Twain State Park		credible-critical	credible-critical	critical	critical			Regional background
Bonne Terre					critical			St.Louis background ozone
Carthage				critical				Source oriented
St. Joseph Pump Station				critical		critical		Meets minimum area requirement
Farrar					critical			Potential maximum area ozone
Alba					critical			Potential maximum area ozone
Eldorado Springs					critical	critical		Western Missouri regional background
NewBloomfield					critical			Potential maximum area ozone
Finger Lakes					critical			Potential maximum area ozone
Savannah					critical			Potential maximum area ozone
Buick NE**		critical					critical	Source oriented
Exide Levee							critical	Source oriented
Oates**							critical	Source oriented
Fletcher							critical	Source oriented
St. Joe State Park							critical	

*In ozone nonattainment area

**In lead nonattainment area

Table ES-2. Summary of Industry-Operated Monitoring Sites

	Pollutant		Comments
Site	**SO_2**	**Lead**	
SO_2 Sites			
Doe Run BRRF County Road 75	critical		Data Requirements Rule (DRR) site
Doe Run BRRF Highway 32	critical		DRR site
Doe Run BRRF W. Entrance	critical		DRR site
Magnitude 7 Metals Site 1	critical		DRR site
Magnitude 7 Metals Site 2	critical		DRR site
Magnitude 7 Metals Site 3	critical		DRR site
Ameren Labadie Valley	critical		DRR site
Ameren Labadie Northwest	critical		DRR site
Ameren Labadie North	critical		DRR site
Ameren Labadie Southwest	critical		DRR site
Ameren Rush Island Weaver AA	critical		Monitoring under consent agreement consistent with DRR requirements
Ameren Rush Island Natchez	critical		Monitoring under consent agreement consistent with DRR requirements
Ameren Rush Island Fults, Illinois	critical		Monitoring under consent agreement consistent with DRR requirements
Lead Sites			
Herculaneum-Dunklin High School		critical	Monitoring required by consent judgment
Herculaneum-City Hall		critical	Monitoring required by consent judgment
Herculaneum-North Cross		critical	
Herculaneum-Church		critical	non-ambient site*
Buick North		critical	non-ambient site*, monitoring required by consent judgment
Buick South		critical	non-ambient site*, monitoring required by consent judgment
Buick Northeast		critical	
Glover-Post Office		critical	non-ambient site*, monitoring required by consent agreement
Glover-Big Creek		critical	non-ambient site*, monitoring required by consent agreement

*Non-ambient sites are within facility fencelines, not open to the pubic. Monitoring may be required at these sites by a consent agreement.

1.0 Background and Introduction

1.1 Regulatory Requirements

The regulatory requirement for an air monitoring network assessment is found in 40 Code of Federal Regulations (CFR) 58.10 (d):

> "The State, or where applicable local, agency shall perform and submit to the EPA Regional Administrator an assessment of the air quality surveillance system every 5 years to determine, at a minimum, if the network meets the monitoring objectives defined in Appendix D to this part, whether new sites are needed, whether existing sites are no longer needed and can be terminated, and whether new technologies are appropriate for incorporation into the ambient air monitoring network. The network assessment must consider the ability of existing and proposed sites to support air quality characterization for areas with relatively high populations of susceptible individuals (e.g., children with asthma), and, for any sites that are being proposed for discontinuance, the effect on data users other than the agency itself, such as nearby States and Tribes or health effects studies. For $PM_{2.5}$, the assessment also must identify needed changes to population-oriented sites. The State, or where applicable local, agency must submit a copy of this 5-year assessment, along with a revised annual network plan, to the Regional Administrator. The first assessment is due July 1, 2010."

This document is intended to meet this requirement. This is the third network assessment required by the regulation; the first one was completed in 2010, and the second one in 2015.

1.2 Assessment Approach

Assessment of various portions of the air monitoring network in Missouri have been a part of past planning documents, including annual Monitoring Network Plans and the 2010 and 2015 Air Monitoring Network Assessments. Changes in the network since the 2015 assessment, documented in annual network plans, have been made based in part on the 2010 and 2015 assessments and also based on changes in regulations and on changes in the availability of resources. Some of the changes, including discontinuance of some monitors (especially carbon monoxide, sulfur dioxide, and nitrogen dioxide monitors) after 2015 will be evident in the air monitoring data presented in the following sections.

This assessment is intended to be consistent with the Environmental Protection Agency (EPA) Region 7 guidance issued in advance of the 2010 Network Assessment (Appendix B).

This assessment includes analysis of sulfur dioxide (SO_2), nitrogen dioxide (NO_2), particulate matter smaller than 10 micrometers (PM_{10}), carbon monoxide (CO), ozone (O_3), particulate matter smaller than 2.5 micrometers ($PM_{2.5}$) and lead (Pb) monitoring networks.

In addition to identification of monitoring sites in the subsequent sections, Appendix C, the Network Table, includes a complete list of monitoring sites, location of the sites, parameters being monitored, etc., in Missouri.

2.0 Population

The 2010 census reported a Missouri population of 5,988,927, an increase of 7% from the 2000 population. Figure 2-1 shows the distribution of population in Missouri in 2010; each dot on the map represents 50 persons. This map shows the two largest population centers in the St. Louis and Kansas City areas and also other population centers including the Springfield, Joplin, Columbia, Jefferson City and St. Joseph areas.

Figure 2-2 shows Missouri Core Based Statistical Areas (CBSAs) as defined in 2013. CBSAs include Metropolitan Statistical Areas (MSAs), with population of 50,000 or more and Micropolitan Statistical Areas, with populations of 10,000 or more but less than 50,000. Each CBSA includes one or more counties. Table 2-1 lists the 2010 populations of the Missouri portion of each of the Missouri MSAs. In summary, 4.4 million of the 6.0 million persons in Missouri lived in the 9 MSAs that lie in whole or in part in Missouri. Two point one million of these persons lived in the Missouri portion of the St. Louis MSA, and 1.2 million of these persons lived in the Missouri portion of the Kansas City MSA.

Table 2-2 lists the 2000 and 2010 census populations, population change and the percentage change in population for each Missouri county. Figure 2-3 shows the 2010 population by county, and Figure 2-4 shows the percentage changes from 2000 to 2010 by county. In the vicinity of the large urban areas, the principal growth areas were not in the urban core, but in suburban areas. Other growth areas included the Springfield, Branson, Columbia and Fort Leonard Wood areas.

The U. S. Census Bureau has estimated the 2019 population in each county in Missouri. These population estimates are listed in Table 2-3 and shown in Figure 2-5.

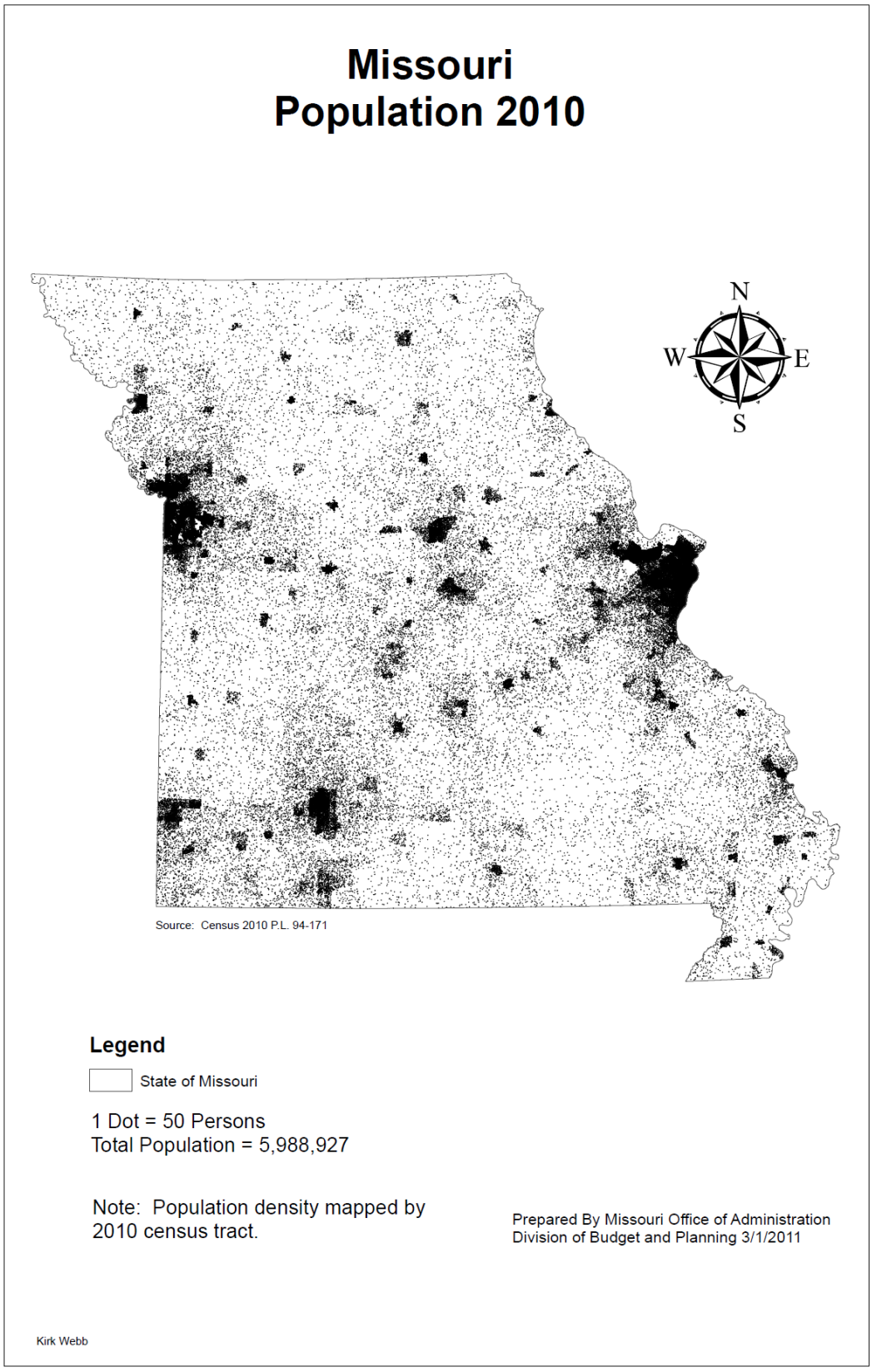


Figure 2-1. Missouri Population Density

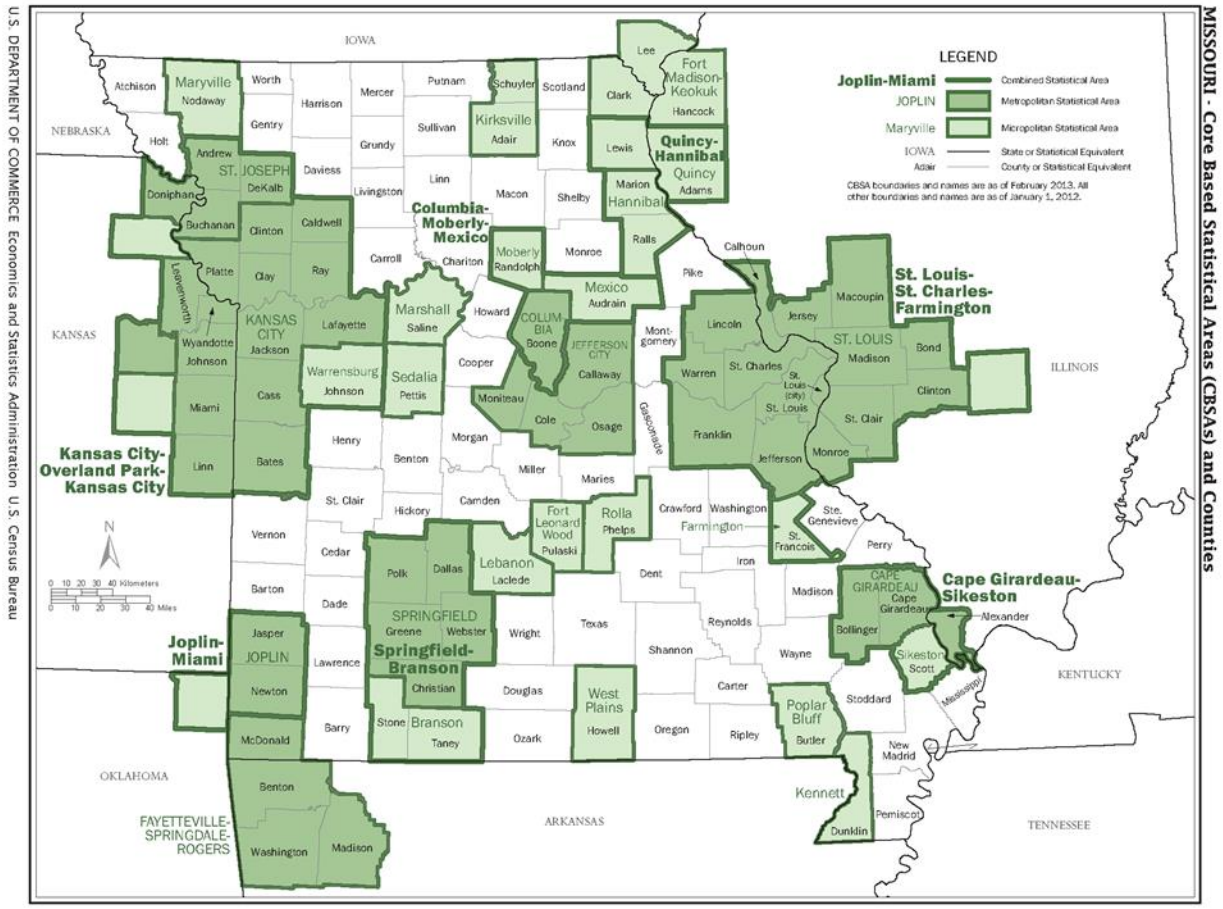


Figure 2-2. Missouri Core Based Statistical Areas

Table 2-1. 2010 Population in Missouri Metropolitan Statistical Areas (MSA)	
MSA	**2010 Population**
St. Louis (part)	2,084,037
Kansas City (part)	1,188,988
Springfield	436,712
Joplin	175,518
Columbia	162,642
Jefferson City	149,807
St. Joseph (part)	119,384
Cape Girardeau (part)	88,037
Fayetteville-Springdale-Rogers (part)	23,083
Total Population in Missouri MSA's	**4,428,208**

Table 2-2. Missouri
County Population Change 2000 to 2010
Numeric and Percent Change

Name	2000 Census Total Population	2010 Census Total Population	Population Change Over the Decade	Percent Change
Adair	24,977	25,607	630	3%
Andrew	16,492	17,291	799	5%
Atchison	6,430	5,685	-745	-12%
Audrain	25,853	25,529	-324	-1%
Barry	34,010	35,597	1,587	5%
Barton	12,541	12,402	-139	-1%
Bates	16,653	17,049	396	2%
Benton	17,180	19,056	1,876	11%
Bollinger	12,029	12,363	334	3%
Boone	135,454	162,642	27,188	20%
Buchanan	85,998	89,201	3,203	4%
Butler	40,867	42,794	1,927	5%
Caldwell	8,969	9,424	455	5%
Callaway	40,766	44,332	3,566	9%
Camden	37,051	44,002	6,951	19%
Cape Girardeau	68,693	75,674	6,981	10%
Carroll	10,285	9,295	-990	-10%
Carter	5,941	6,265	324	5%
Cass	82,092	99,478	17,386	21%
Cedar	13,733	13,982	249	2%
Chariton	8,438	7,831	-607	-7%
Christian	54,285	77,422	23,137	43%
Clark	7,416	7,139	-277	-4%
Clay	184,006	221,939	37,933	21%
Clinton	18,979	20,743	1,764	9%
Cole	71,397	75,990	4,593	6%
Cooper	16,670	17,601	931	6%
Crawford	22,804	24,696	1,892	8%
Dade	7,923	7,883	-40	-1%
Dallas	15,661	16,777	1,116	7%
Daviess	8,016	8,433	417	5%
DeKalb	11,597	12,892	1,295	11%
Dent	14,927	15,657	730	5%
Douglas	13,084	13,684	600	5%
Dunklin	33,155	31,953	-1,202	-4%
Franklin	93,807	101,492	7,685	8%
Gasconade	15,342	15,222	-120	-1%
Gentry	6,861	6,738	-123	-2%
Greene	240,391	275,174	34,783	14%
Grundy	10,432	10,261	-171	-2%
Harrison	8,850	8,957	107	1%
Henry	21,997	22,272	275	1%
Hickory	8,940	9,627	687	8%
Holt	5,351	4,912	-439	-8%
Howard	10,212	10,144	-68	-1%
Howell	37,238	40,400	3,162	8%
Iron	10,697	10,630	-67	-1%
Jackson	654,880	674,158	19,278	3%
Jasper	104,686	117,404	12,718	12%
Jefferson	198,099	218,733	20,634	10%
Johnson	48,258	52,595	4,337	9%
Knox	4,361	4,131	-230	-5%
Laclede	32,513	35,571	3,058	9%
Lafayette	32,960	33,381	421	1%
Lawrence	35,204	38,634	3,430	10%
Lewis	10,494	10,211	-283	-3%
Lincoln	38,944	52,566	13,622	35%
Linn	13,754	12,761	-993	-7%
Livingston	14,558	15,195	637	4%

Table 2-2 continued				
McDonald	21,681	23,083	1,402	6%
Macon	15,762	15,566	-196	-1%
Madison	11,800	12,226	426	4%
Maries	8,903	9,176	273	3%
Marion	28,289	28,781	492	2%
Mercer	3,757	3,785	28	1%
Miller	23,564	24,748	1,184	5%
Mississippi	13,427	14,358	931	7%
Moniteau	14,827	15,607	780	5%
Monroe	9,311	8,840	-471	-5%
Montgomery	12,136	12,236	100	1%
Morgan	19,309	20,565	1,256	7%
New Madrid	19,760	18,956	-804	-4%
Newton	52,636	58,114	5,478	10%
Nodaway	21,912	23,370	1,458	7%
Oregon	10,344	10,881	537	5%
Osage	13,062	13,878	816	6%
Ozark	9,542	9,723	181	2%
Pemiscot	20,047	18,296	-1,751	-9%
Perry	18,132	18,971	839	5%
Pettis	39,403	42,201	2,798	7%
Phelps	39,825	45,156	5,331	13%
Pike	18,351	18,516	165	1%
Platte	73,781	89,322	15,541	21%
Polk	26,992	31,137	4,145	15%
Pulaski	41,165	52,274	11,109	27%
Putnam	5,223	4,979	-244	-5%
Ralls	9,626	10,167	541	6%
Randolph	24,663	25,414	751	3%
Ray	23,354	23,494	140	1%
Reynolds	6,689	6,696	7	0%
Ripley	13,509	14,100	591	4%
St. Charles	283,883	360,485	76,602	27%
St. Clair	9,652	9,805	153	2%
Ste. Genevieve	17,842	18,145	303	2%
St. Francois	55,641	65,359	9,718	17%
St. Louis	1,016,315	998,954	-17,361	-2%
Saline	23,756	23,370	-386	-2%
Schuyler	4,170	4,431	261	6%
Scotland	4,983	4,843	-140	-3%
Scott	40,422	39,191	-1,231	-3%
Shannon	8,324	8,441	117	1%
Shelby	6,799	6,373	-426	-6%
Stoddard	29,705	29,968	263	1%
Stone	28,658	32,202	3,544	12%
Sullivan	7,219	6,714	-505	-7%
Taney	39,703	51,675	11,972	30%
Texas	23,003	26,008	3,005	13%
Vernon	20,454	21,159	705	3%
Warren	24,525	32,513	7,988	33%
Washington	23,344	25,195	1,851	8%
Wayne	13,259	13,521	262	2%
Webster	31,045	36,202	5,157	17%
Worth	2,382	2,171	-211	-9%
Wright	17,955	18,815	860	5%
St. Louis city	348,189	319,294	-28,895	-8%
Missouri	**5,595,211**	**5,988,927**	**393,716**	**7%**

Source: Census 2000 - SF1 and 2010 P.L. 94-171

Prepared by Missouri Office of Administration-Division of Budget and Planning 2/24/2011

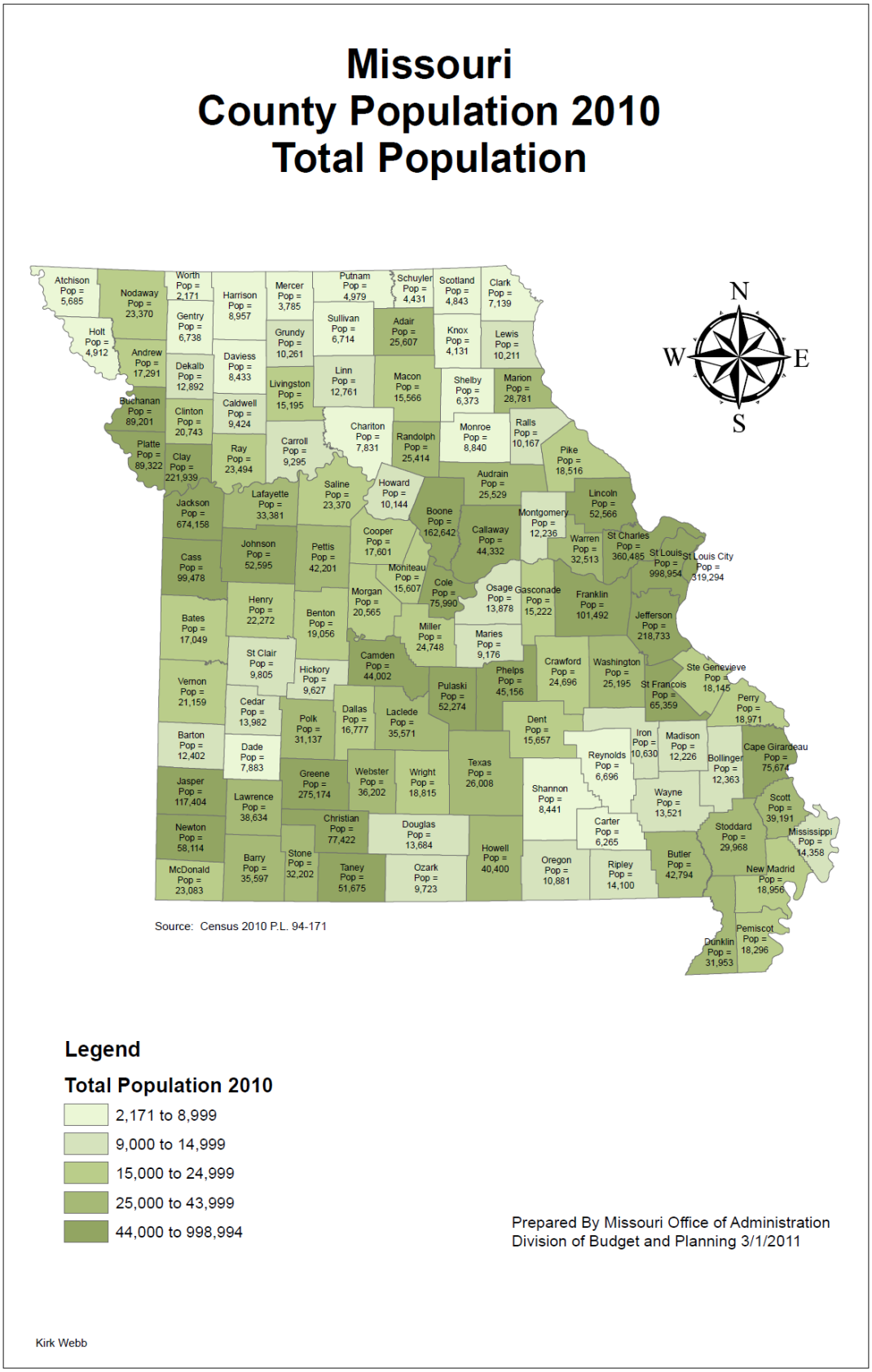


Figure 2-3. Missouri County Population, 2010

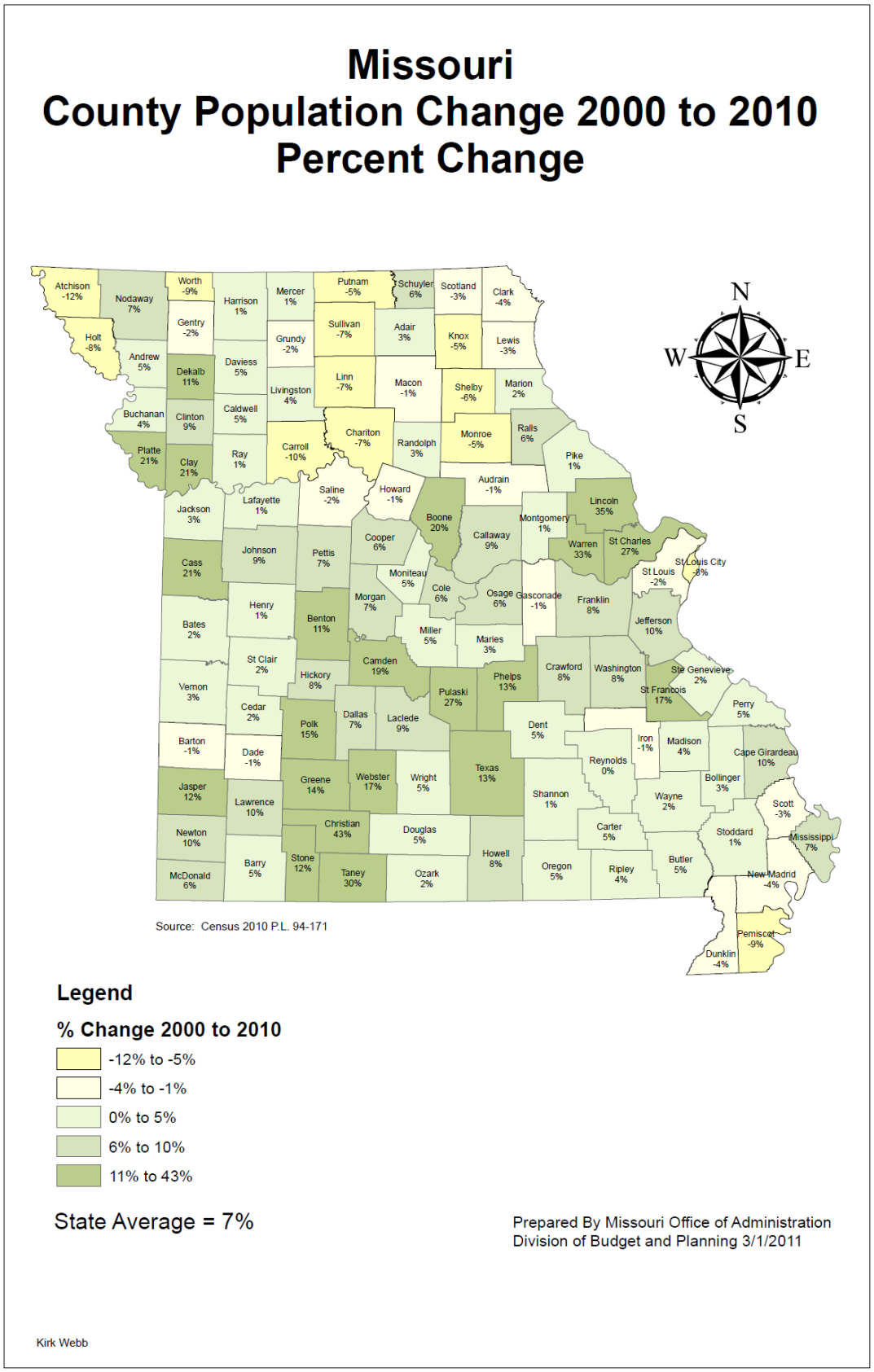


Figure 2-4. Missouri County Population Change, 2000 to 2010

Table 2-3. Missouri Projected Population by County		
County	**Census Population**	**Estimated Population**
	2010	**2019**
Adair	25,607	25,343
Andrew	17,291	17,712
Atchison	5,685	5,143
Audrain	25,529	25,388
Barry	35,597	35,789
Barton	12,402	11,754
Bates	17,049	16,172
Benton	19,056	19,443
Bollinger	12,363	12,133
Boone	162,642	180,463
Buchanan	89,201	87,364
Butler	42,794	42,478
Caldwell	9,424	9,020
Callaway	44,332	44,743
Camden	44,002	46,305
Cape Girardeau	75,674	78,871
Carroll	9,295	8,679
Carter	6,265	5,982
Cass	99,478	105,780
Cedar	13,982	14,349
Chariton	7,831	7,426
Christian	77,422	88,595
Clark	7,139	6,797
Clay	221,939	249,948
Clinton	20,743	20,387
Cole	75,990	76,745
Cooper	17,601	17,709
Crawford	24,696	23,920
Dade	7,883	7,561
Dallas	16,777	16,878
Daviess	8,433	8,278
DeKalb	12,892	12,547
Dent	15,657	15,573
Douglas	13,684	13,185
Dunklin	31,953	29,131
Franklin	101,492	103,967
Gasconade	15,222	14,706
Gentry	6,738	6,571
Greene	275,174	293,086
Grundy	10,261	9,850
Harrison	8,957	8,352
Henry	22,272	21,824
Hickory	9,627	9,544
Holt	4,912	4,403
Howard	10,144	10,001
Howell	40,400	40,117
Iron	10,630	10,125
Jackson	674,158	703,011
Jasper	117,404	121,328
Jefferson	218,733	225,081
Johnson	52,595	54,062
Knox	4,131	3,959
Laclede	35,571	35,723
Lafayette	33,381	32,708
Lawrence	38,634	38,355
Lewis	10,211	9,776
Lincoln	52,566	59,013
Linn	12,761	11,920
Livingston	15,195	15,227

Table 2-3 continued		
McDonald	23,083	22,837
Macon	15,566	15,117
Madison	12,226	12,088
Maries	9,176	8,697
Marion	28,781	28,530
Mercer	3,785	3,617
Miller	24,748	25,619
Mississippi	14,358	13,180
Moniteau	15,607	16,132
Monroe	8,840	8,644
Montgomery	12,236	11,551
Morgan	20,565	20,627
New Madrid	18,956	17,076
Newton	58,114	58,236
Nodaway	23,370	22,092
Oregon	10,881	10,529
Osage	13,878	13,615
Ozark	9,723	9,174
Pemiscot	18,296	15,805
Perry	18,971	19,136
Pettis	42,201	42,339
Phelps	45,156	44,573
Pike	18,516	18,302
Platte	89,322	104,418
Polk	31,137	32,149
Pulaski	52,274	52,607
Putnam	4,979	4,696
Ralls	10,167	10,309
Randolph	25,414	24,748
Ray	23,494	23,018
Reynolds	6,696	6,270
Ripley	14,100	13,288
St. Charles	360,485	402,022
St. Clair	9,805	9,397
Ste. Genevieve	18,145	17,894
St. Francois	65,359	67,215
St. Louis	998,954	994,205
Saline	23,370	22,761
Schuyler	4,431	4,660
Scotland	4,843	4,902
Scott	39,191	38,280
Shannon	8,441	8,166
Shelby	6,373	5,930
Stoddard	29,968	29,025
Stone	32,202	31,952
Sullivan	6,714	6,089
Taney	51,675	55,928
Texas	26,008	25,398
Vernon	21,159	20,563
Warren	32,513	35,649
Washington	25,195	24,730
Wayne	13,521	12,873
Webster	36,202	39,592
Worth	2,171	2,013
Wright	18,815	18,289
St. Louis city	319,294	300,576
Missouri total	**5,988,927**	**6,137,428**

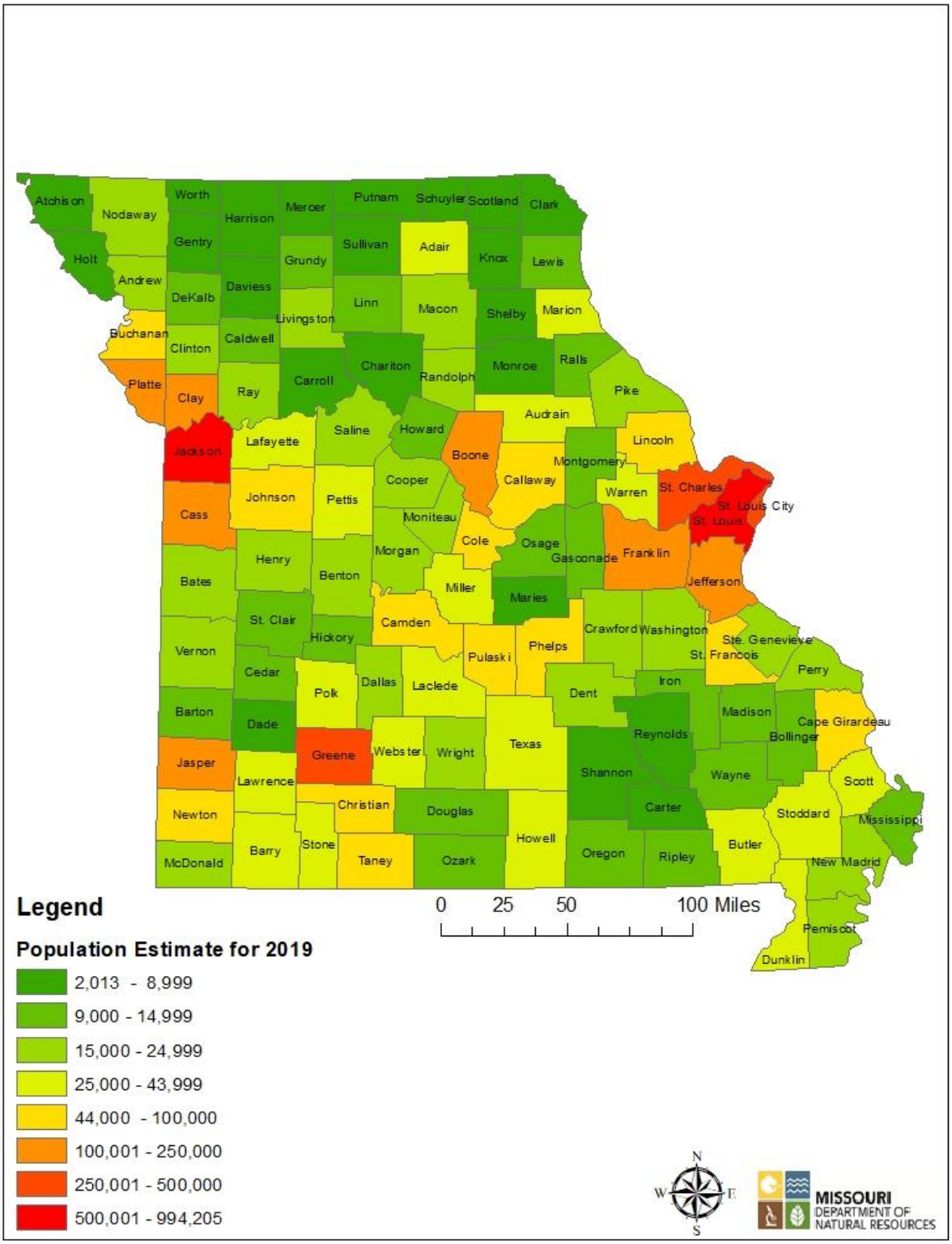


Figure 2-5. Missouri Estimated Population by County, 2019

3.0 General Climate of Missouri

Missouri is located in the middle of the North American continent and normally has the full four seasons of spring, summer, fall and winter. Summers are normally hot and humid and winters are cool to cold. Due to the location in the interior United States, Missouri often experiences extreme temperatures that can range throughout the year from 100 degrees Fahrenheit (°F) or greater to below 0°F. Not having either large mountains or oceans nearby to moderate the temperatures, the climate is influenced by air from the cold arctic in the winter to hot humid Gulf of Mexico air during the summer. There can be exceptionally high or low readings in temperatures throughout the year. Missouri will occasionally receive the remains of hurricanes. Thunderstorms also have occurred every month of the year.

3.1 Spring

Spring ranges from March through May and is normally the wettest season of the year as the jet stream fluctuates and develops disturbances along its path. Winds will range throughout the compass as systems move through.

Average Temperature Ranges: 76°F to 33°F.

3.2 Summer

Summer normally runs from June through August, with less precipitation, as high pressure usually dominates the area with warm moist air being moved in from the Gulf of Mexico. Winds are generally from a southerly component.

Average Temperature Ranges: 90°F to 62°F.

3.3 Fall

Fall is considered from September to November. At this time of year temperatures can move into the 80°F or higher range in the early fall season, but will normally drop slowly toward the end of fall. Winds normally are still from the southern component, but will slowly shift to a more northwesterly component later in the season as the jet stream shifts south.

Average Temperature Ranges: 81°F to 33°F.

3.4 Winter

Winter is classified as running from December through February. Normally the northern portion of the state receives most of the frozen precipitation, but occasionally with the location of the jet stream and fluctuations of it, south Missouri may receive more. Winds are generally from a

northwesterly component, but occasionally winds will become southerly allowing for a slight warming period.

Average Temperature Ranges: 46°F to18°F.

3.5 Ozone

Generally, ozone episodes occur in the summer when high pressure moves to the east of Missouri along with an upper level ridge over the area. Ozone may form in the spring and fall but mainly during the summer months. Temperatures will be allowed to increase and abundant sunshine will prevail. Winds will generally be calm to light and from a southerly component. With the downward motion of the air an inversion will set up and hold the air stagnant and trapped allowing for readings to increase. This is the predominant condition, but there have been other conditions when an episode has occurred such as air transport. Fires and controlled burns have also influenced high readings at times.

3.6 $PM_{2.5}$, SO_2, and NOx

Both local surface meteorology and transport can affect $PM_{2.5}$ levels. Regional weather patterns bring air masses into St. Louis from various emission source regions, including those with large SO_2 and nitrogen oxide (NO_X) precursor gases, and some sources of direct $PM_{2.5}$. The $PM_{2.5}$ which moves over a moderately stable air mass (light surface winds) located over an area will allow infusion of the fine particle laden air to settle into the area. For example, summertime high pressure systems are often centered over the Ohio Valley area that not only bring air masses from the SO_2 emissions-rich regions of the Ohio River Valley and Tennessee Valley into St. Louis, but also create local conditions that are often stagnant or nearly stagnant. NO_X transport is not so clearly defined, although it can occur from north and northwest, or the south and southwest.

3.7 Wind Roses (Appendix A)

Wind roses based on data from major airports were selected to represent regions in Missouri. The selected airport representing the west was Kansas City International Airport (KMCI). For the south, the Springfield Airport (KSGF) was selected. Lambert-St. Louis International Airport (KSTL) was selected for the east, and Kirksville Airport (KIRK) was selected for the outstate region. Airport sites report official weather observations for the National Weather Service, and data are archived at the National Centers for Environmental Information (NCEI), previously the National Climatic Data Center (NCDC) for easy access.

4.0 New Emission Sources

New larger emission sources are primarily those permitted under the Prevention of Significant Deterioration (PSD) program. For some years those permits have been issued, in which potential emissions increases are tracked (often conditionally limited in the permit) and air quality analysis conducted as necessary. Table 4-1 lists PSD permits issued in Missouri from the years 2015 through 2019 and the associated emission increases. If air quality analysis was part of the permit it may include modeling or ambient air monitoring. Monitoring may be predicated either on the need to determine localized ambient levels associated with the increment analysis or in a few cases where modeled pollutant levels may have been close to the NAAQS to ensure that those are not exceeded in monitoring.

4.1 Carbon Monoxide (CO)

There are large increases in emissions of CO at two of the facilities listed in the table. However, CO point source emissions increases are not associated with NAAQS exceedances, but rather increment consumption. The increases also contribute to increases in urban-wide levels, which may contribute to background levels in the neighborhood of large mobile source emissions. Given the lack of association with direct NAAQS exceedance impacts, and the fact that the identified CO increases are not in the urban core areas, we believe the point source emission increases are not by themselves a cause for increased ambient monitoring, particularly to evaluate NAAQS compliance.

4.2 Ozone

NO_X and VOCs are known precursors of ozone. NOx and VOC emissions are not generally correlated in monitoring or air quality analysis with a localized ozone NAAQS problem but instead contribute to urban area concentrations or downwind ozone concentrations. Some individual permits for various pollutants have generated additional monitoring to determine current ozone levels downwind of large VOC source emission increases, when current monitoring nearby was not available.

Owens Corning has the most VOC increase among the permitted facilities during the period. The permit for that facility did not require (as a condition) ozone monitoring for preconstruction. The state monitoring site at Alba is located approximately 15 miles northeast and relatively downwind of the Owens Corning facility. Ozone 4^{th} high values at the site have decreased by 15% since 2015. The site's 2019 4^{th} high is at 61 parts per billion (ppb), well below the level of the NAAQS. VOC emissions from this facility are not likely to be a deciding factor in ozone monitoring site placement.

4.3 PM_{10} and SO_2

The Owens Corning facility discussed above also has the largest increase of PM_{10} and SO_2 emissions among the permitted sources. However, no PM_{10} monitoring has shown an increase attributable to that source, and the SO_2 increase is well below the 2,000 tons per year level that would require source-oriented monitoring or modeling.

Table 4-1. 2015 – 2019 Missouri PSD Permits and Associated Emission Increase

					Emissions, tons per year								
Facility Name	**Description**	**Permit Completion Date**	**City**	**County**	**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**Comments**
Nucor Steel Sedalia, LLC	Steel Mill	9/12/2018	Sedalia	Pettis	66.85	60.23	49.68	112.77	80.18	100.62	816.87	0.11	New steel mill
River Cement Company	Increase Production	1/18/2017	Festus	Jefferson	-369	-90.2	9.8	30.2	37.2	9.8	907.4	0.011	Increase in clinker prodution
Metal Container Corporation	Line Changes	12/21/2016	Arnold	Jefferson	5.24	6.24	6.24	0.1	17.41	143.3	14.63		Non-attainment area. Had to offset VOC increase
Owens Corning	Mineral Wool	5/12/2016	Joplin	Jasper	119.87	277.35	241.81	141.94	126.32	475.69	154.54	0.11	New mineral wool fiber
Columbia Municipal Power Plant	NOx Reduction Project	12/8/2015	Columbia	Boone	24.84	14.99	9.74	-1054	-44.6	-5.52	135.97		Changed fuel to bimass
Ag Processing, Inc.	Increase Oilseed Production	7/27/2015	St. Joseph	Buchanan						65.49			Increase production, no new emission units

5.0 Carbon Monoxide Network Assessment

5.1 Introduction: Carbon Monoxide Standards and Monitoring Requirements

The primary NAAQS for CO are:

- 35 parts per million by volume (ppm) for one hour.

- 9 ppm for eight hours.

These concentrations must not be exceeded more than once per year. There is no secondary CO standard. The NAAQS are listed in the EPA NAAQS Table on the internet. The CO NAAQS were reviewed but left unchanged by a final rule published in August 2011.

In 2006, EPA issued revised air monitoring requirements (71 Federal Register 61235, Oct. 17, 2006). Unlike monitoring requirements for other pollutants, there are no required minimum numbers of CO monitoring sites in cities or metropolitan statistical areas. Because airborne CO results primarily from internal combustion engine exhaust, sites chosen for CO monitoring should be microscale or middle scale, as described in the following quotations from the monitoring regulations (71 Federal Register 61319, Oct. 17, 2006; also 40 CFR, Part 58, Appendix D, 4.2.3):

- Microscale: "This scale applies when air quality measurements are to be used to represent distributions within street canyons, over sidewalks and near major roadways. In the case with carbon monoxide, microscale measurements in one location can often be considered as representative of other similar locations in a city."

- Middle Scale: "Middle scale measurements are intended to represent areas with dimensions from 100 meters to 0.5 kilometer. In certain cases, middle scale measurements may apply to areas that have a total length of several kilometers, such as ''line'' emission source areas. This type of emission sources areas would include air quality along a commercially developed street or shopping plaza, freeway corridors, parking lots and feeder streets.

CO monitoring is specifically required at near-road sites (see Section 7.0) in CBSAs with a population of 1 million or larger (40 CFR, Part 58, Appendix D, 4.2.1).

5.2 CO Monitoring Results in Missouri

The locations of the current CO monitoring sites are shown on the map in Figure 5-1. Second maximum 1-hour and 8-hour average CO concentrations (design values) measured at locations in Missouri since 2015 are listed in Table 5-1 and shown in Figures 5-2 and 5-3. Design values at all of these sites were well below the NAAQS.

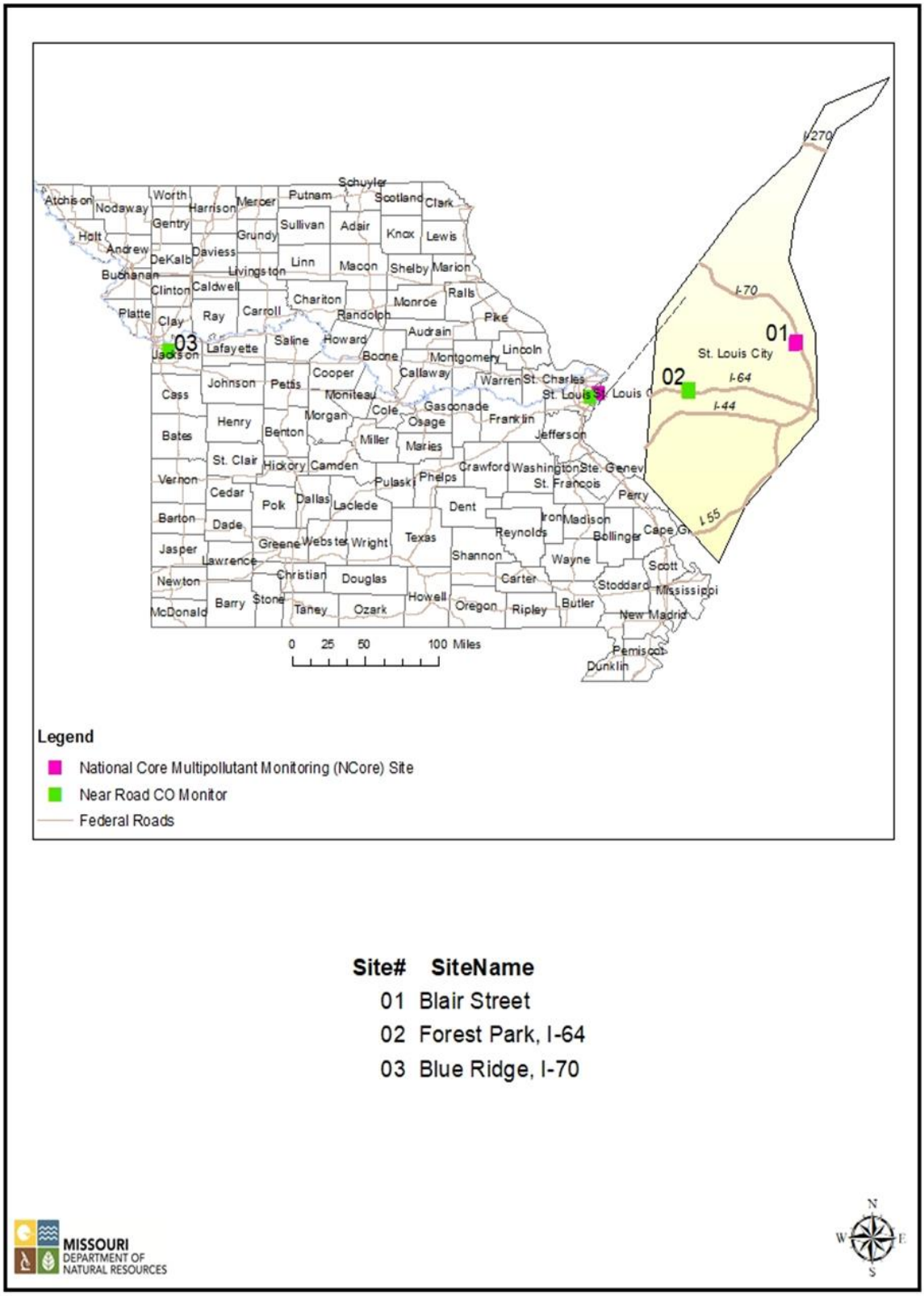


Figure 5-1. Missouri CO Monitoring Network, 2020

Table 5-1

Carbon Monoxide 1-Hour Design Value (annual second-highest 1-hour average in ppm)					
	2015	**2016**	**2017**	**2018**	**2019**
Blair Street	1.7	2.4	2.0	1.5	2.5
Forest Park, I-64	1.6	2.2	1.5	1.6	1.2
Blue Ridge, I-70	1.3	1.4	1.6	1.9	1.4
Carbon Monoxide 8-Hour Design Value (annual second-highest 8-hour average in ppm)					
	2015	**2016**	**2017**	**2018**	**2019**
Blair Street	1.4	1.5	1.4	1.3	1.7
Forest Park, I-64	1.2	1.4	1.0	1.1	0.6
Blue Ridge, I-70	1.0	1.0	1.1	1.1	1.0

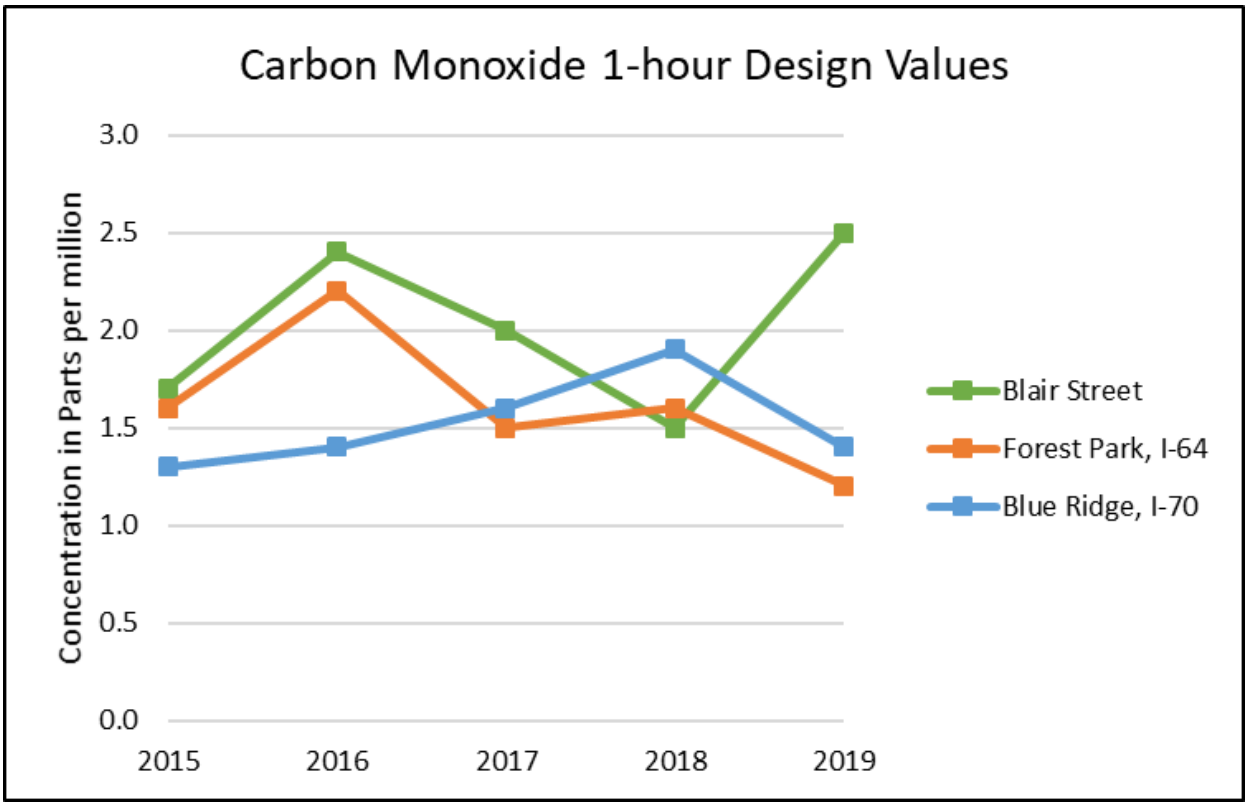


Figure 5-2. Carbon Monoxide 1-hour Design Values

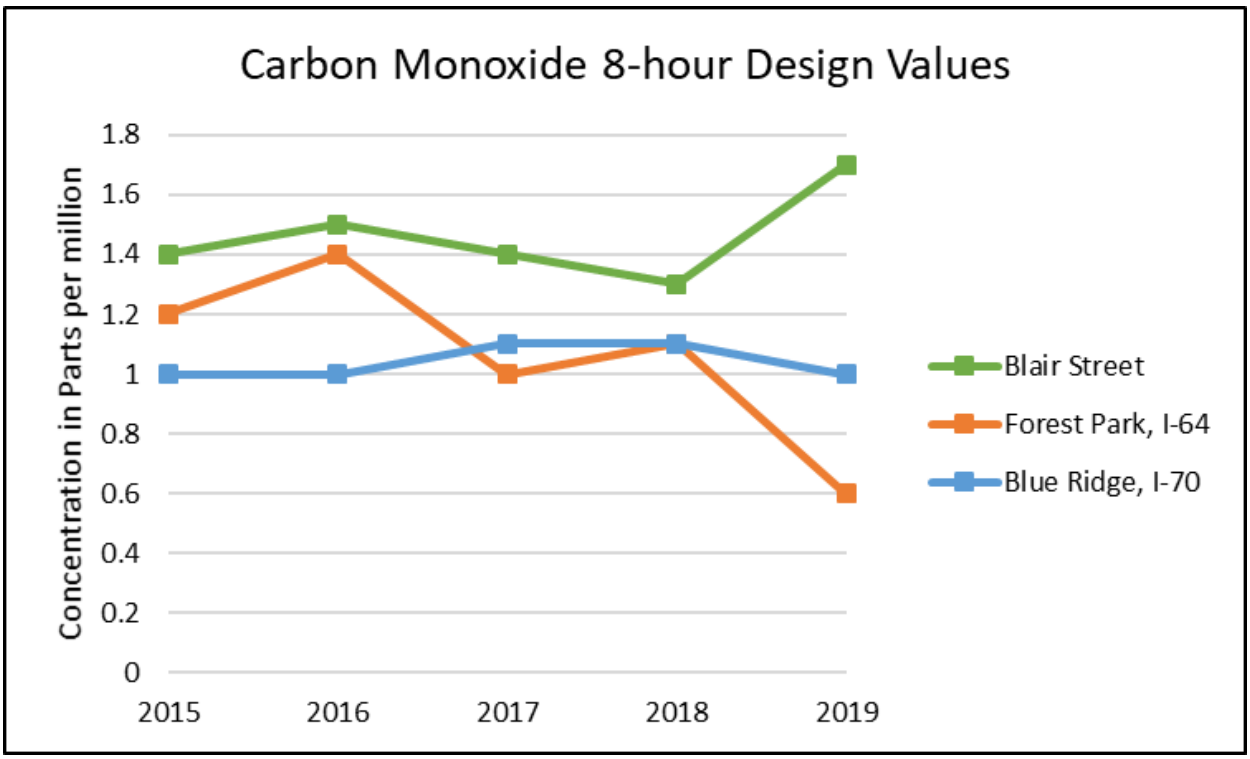


Figure 5-3. Carbon Monoxide 8-hour Design Values

5.3 CO Emissions

CO emissions occur primarily from internal combustion engines. The majority of such emissions are from motor vehicles. Figures 5-4 and 5-5 show portions of Missouri Department of Transportation maps with numbers indicating annual average daily traffic on major roadways in the St. Louis and Kansas City areas. The locations of the near-roadway sites were selected in part based on their proximity to highway segments with high traffic counts. A more recent interactive Missouri traffic volume map with color coding for ranges of traffic volume is available online.

Area sources of CO other than mobile sources are not as significant as mobile sources and are generally consistent with areas of higher population, as may be seen in Figure 5-6.

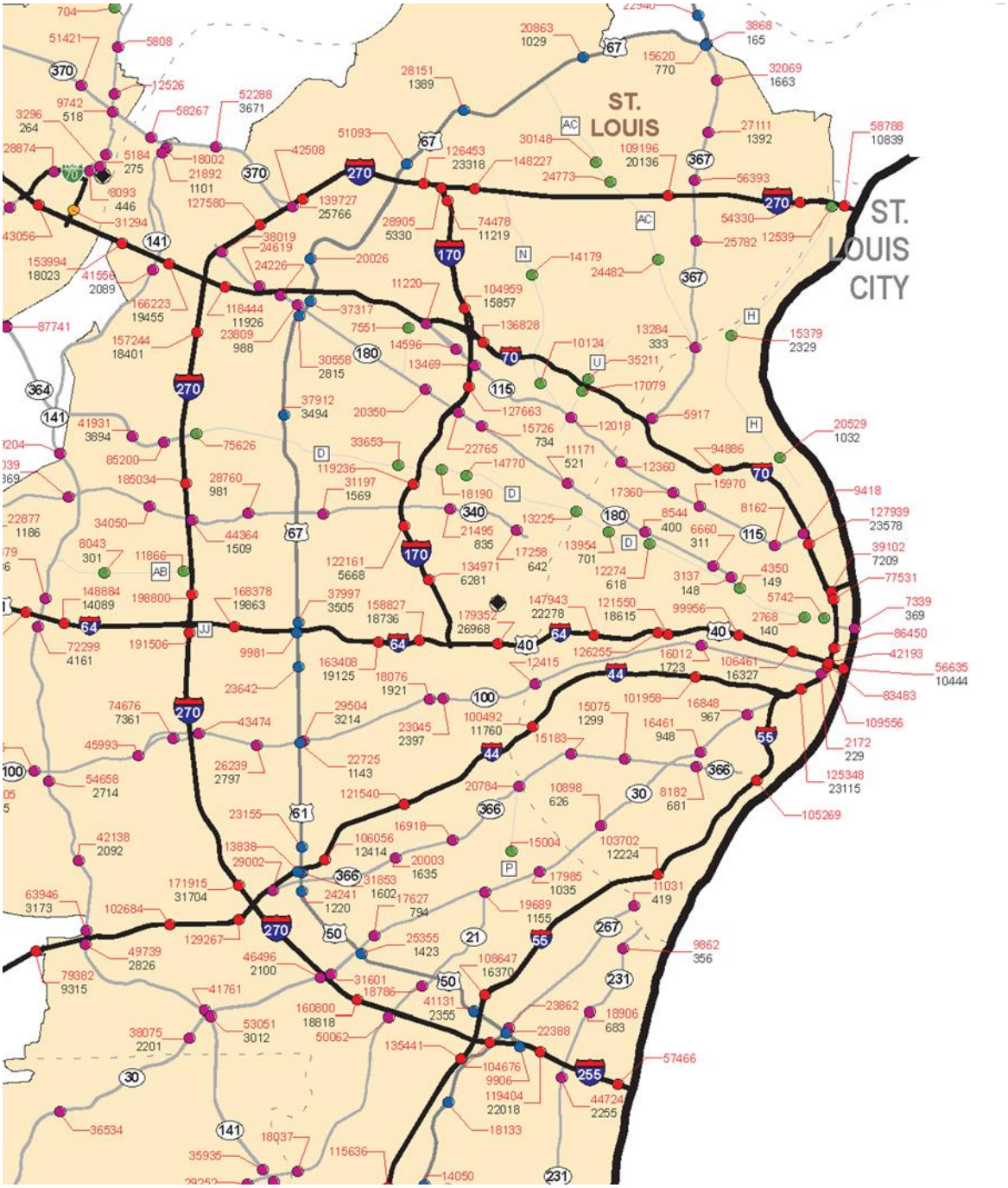


Figure 5-4. St. Louis Area Annual Average Daily Traffic (AADT; in red) and Truck Traffic (in black), 2016, from [MoDOT Archived Traffic Volume Maps]

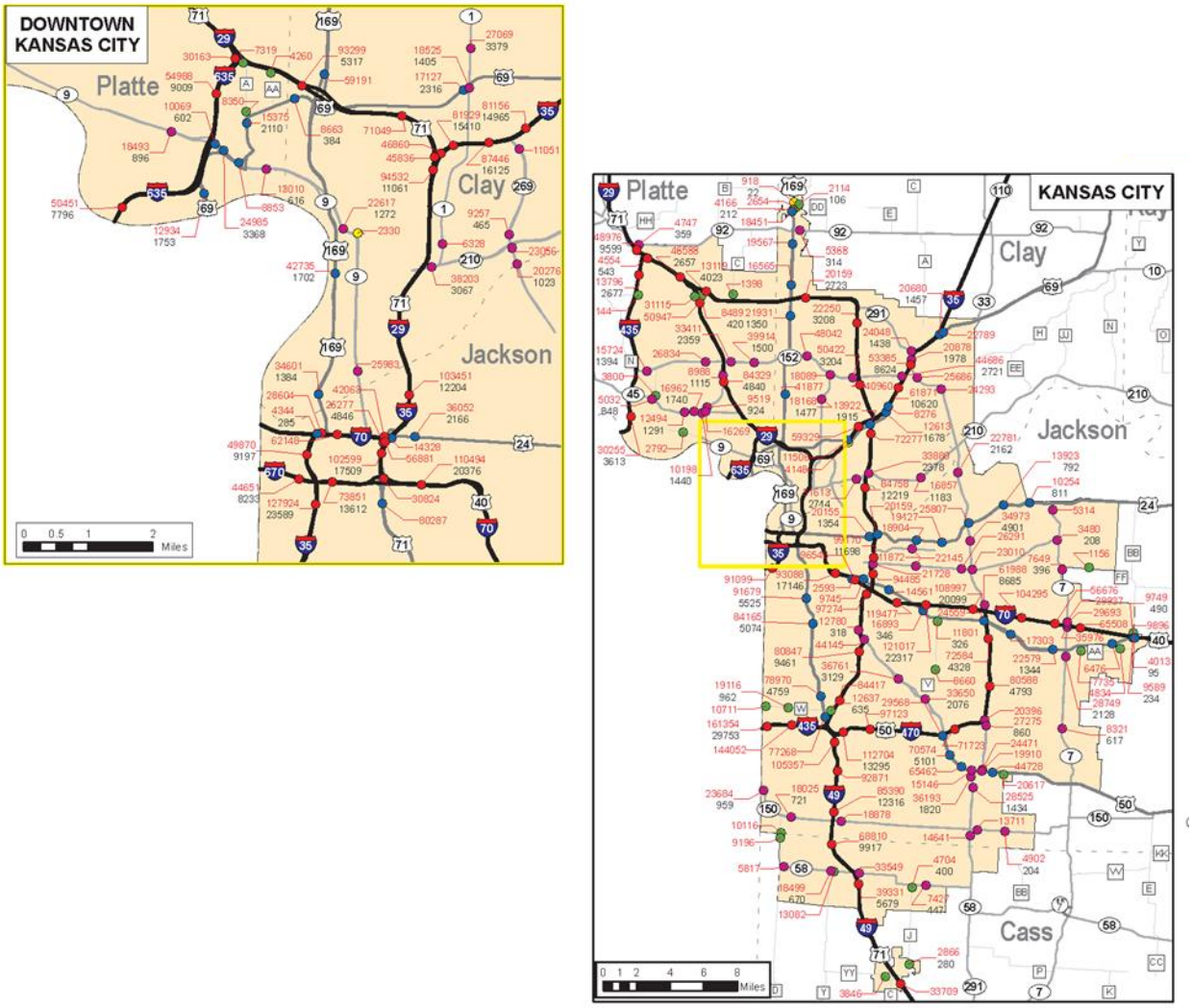


Figure 5-5. Kansas City Area Annual Average Daily Traffic (AADT; in red) and Truck Traffic (in black), 2016, from [MoDOT Archived Traffic Volume Maps]

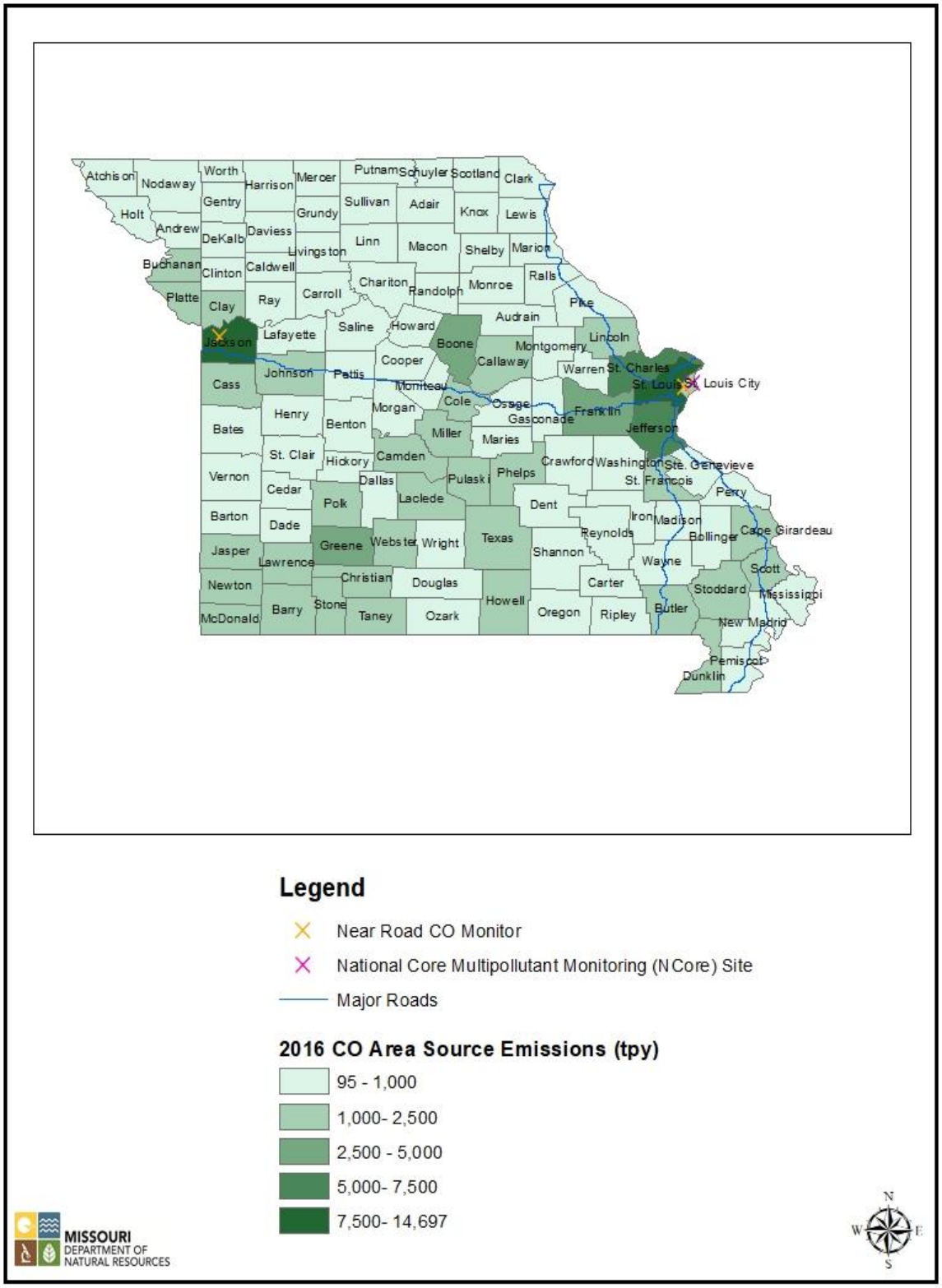


Figure 5-6. Missouri Statewide Area Source CO Emissions, 2016 (not including mobile sources), Major Roadways and the 2020 CO Monitoring Network

5.4 Evaluation of the CO Monitoring Network

CO emissions are primarily from motor vehicle exhaust, and CO monitoring sites should be either microscale, representing street canyons, or middle scale, representing areas including longer roadways or large parking areas. As shown in Table 5-1 and Figures 5-1 and 5-2, CO design values in 2015 through 2019 at all sites remained well below the standards. However, CO monitoring at the three remaining sites is critical, because the Blair Street site is an NCore site, and the other two sites are required near-roadway sites.

6.0 Sulfur Dioxide Network Assessment

6.1 Introduction: Sulfur Dioxide Standards and Monitoring Requirements

The current primary National Ambient Air Quality Standards (NAAQS) for sulfur dioxide (SO_2) is 75 ppb. The form of the standard is the 3-year average of the 99th percentile of annual daily maximum 1-hour averages. The secondary NAAQS is 0.5 ppm, 3-hour average, not to be exceeded more than once per year. The NAAQS are listed in the EPA NAAQS Table on the internet. The SO_2 NAAQS were reviewed, but left unchanged by a final rule published in March 2019.

Minimum monitoring requirements are based on a combination of population and SO_2 emissions in Core Based Statistical Areas (CBSAs; 40 CFR Part 58, Appendix D). For each CBSA, population weighted emission index (PWEI) is calculated by multiplying the population of each CBSA by the total amount of SO_2 in tons per year emitted within the CBSA area based on National Emissions Inventory data. The resulting is then divided by 1 million, so that the units of the PWEI are million persons-tons per year. For any CBSA with a calculated PWEI value equal to or greater than 1 million, a minimum of three SO_2 monitors is required. For any CBSA with a calculated PWEI value equal to or greater than 100,000, but less than 1 million, a minimum of two SO_2 monitors is required. For any CBSA with a calculated PWEI value equal to or greater than 5,000, but less than 100,000, a minimum of one SO_2 monitor is required.

Table 6-1 lists the results of the PWEI calculation for CBSAs that are in whole or in part in Missouri using 2019 population estimates and 2017 NEI emissions data. Based on these results, two SO_2 monitors are required in the St. Louis CBSA and one is required in the Kansas City CBSA. In addition to these requirements, each NCore site must include a trace-level SO_2 analyzer.

In May 2014, EPA published proposed data requirements regulations related to SO_2 air quality monitoring and air quality dispersion modeling near emission sources. These requirements were finalized in the SO_2 Data Requirements Rule (DRR) published in the Federal Register on Aug. 21, 2015. This final rule requires that air agencies must characterize air quality, either by monitoring or modeling, around sources that emit 2,000 tons per year (tpy) or more of SO_2. On Jan. 15, 2016, the Department submitted a final list, available on the internet, identifying the sources in the state around which SO_2 air quality will be characterized. The Ameren Labadie Energy Center and the former Noranda Aluminum, now known as Magnitude 7 Metals, facility were included on that list. The Doe Run Buick Resource Recycling Facility reported emissions less than 2,000 tpy, but was also included on the list because emissions from that facility were uncertain and under review at the time of the January 2016 submittal. The Ameren Rush Island Energy Center was not included in the list, because it is within a previously-designated nonattainment area (designated as nonattainment due to emissions from another facility). Monitoring in the area around Rush Island is being conducted by agreement between the Department and Ameren associated with the plan for the Jefferson County nonattainment area submitted to EPA in December 2017.

For each facility listed in the January 2016 submittal, the state was required to identify by July 1, 2016, the approach (ambient monitoring or air quality modeling) that would be used to characterize air quality or identify sources whose emissions will be limited to less than 2,000 tpy by an enforceable agreement. For source areas that were to be evaluated through ambient monitoring, the air agency was required to submit information on monitoring sites to EPA by July 1, 2016, as part of its annual monitoring network plan. This SO_2 monitoring to meet the DRR was required to begin by Jan. 1, 2017. Monitoring near the Ameren Labadie Energy Center, the Magnitude 7 Metals facility and the Buick Resource Recycling Facility began in January 2017 and is continuing. To meet the requirements of the DRR, these monitors will need a minimum of three years of monitoring data. The sources cannot discontinue monitoring thereafter without EPA approval based on the requirements of 40 CFR 51.1203(c)(3) or 40 CFR 58.14. This monitoring is being conducted by the industries operating the sources, but the monitoring must be conducted in accordance with the SLAMS requirements in 40 CFR Part 58, and the Department reviewed and approved the siting of the monitors based on federal regulations and oversees the operation of the monitors.

In May 2018, the air program submitted a clean data determination request to EPA for the Jackson County nonattainment area where the Troost monitoring station is located based on SO_2 ambient monitoring data from 2015 to 2017. In November 2018, EPA responded requesting Missouri to submit modeling information showing the entire area was attaining the NAAQS. The air program developed and submitted the modeling demonstration to EPA in March 2019, with revisions to the demonstration based on EPA feedback submitted in June 2019. The air program expects EPA to propose the clean data determination for the area in 2020. The air program is currently developing a maintenance plan and redesignation request for the Jackson County SO_2 nonattainment area. The air program is planning to submit these SIP documents to EPA within four to five months after EPA approves the clean data determination. After the air program submits these SIP documents and EPA approves them, EPA will review additional submittals to evaluate the redesignation of the area from nonattainment to attainment.

In September 2017, EPA published in the Federal Register a clean data determination for the Jefferson County nonattainment area where the Mott Street site is located. In December 2017, the air program submitted Missouri's redesignation request and maintenance plan for the Jefferson County nonattainment area to EPA. Based on EPA's Clean Data Policy, the air program withdrew from EPA consideration the Jefferson County nonattainment area plan. Once EPA approves the redesignation request and maintenance plan, it will redesignate the area to attainment. The air program developed a supplemental demonstration to further support the maintenance plan and redesignation request and submitted it to EPA in February 2019. This supplemental demonstration followed EPA's guidelines on air quality models from 40 CFR 51 Appendix W and showed the enforceable requirements on sources in the area are sufficient to maintain the 2010 SO_2 NAAQS throughout the maintenance period.

EPA completed "Round 3" designations by the court-ordered deadline of Dec. 31, 2017. EPA designated all remaining undesignated counties in Missouri, except for Iron and New Madrid counties, as attainment/unclassifiable. This includes a portion of St. Louis County, and the counties of Barton, Jasper, Henry, Greene and Randolph.

“Round 4” designations refers to areas where monitoring is conducted under the Data Requirements Rule, the areas near the Labadie, Buick and Magnitude 7 facilities. Since Labadie was a named source in a court settlement, the area surrounding that source has already been designated as unclassifiable. The four monitors installed around the Ameren Labadie plant all monitor compliance with the 2010 SO_2 NAAQS based on 2017 to 2019 preliminary monitoring data. The air program is currently developing a redesignation request from unclassifiable to attainment/unclassifiable based on this data.

EPA must publish final designations for the areas surrounding the other sources by Dec. 31, 2020. The air program submitted area boundary designation recommendations to EPA in May 2020 using 2017 to 2019 monitoring data from the new monitoring sites. Only one area in the state, near the Magnitude 7 Metals facility and the nearby New Madrid Power Plant exceeds the NAAQS. The area near the Buick facility is monitoring compliance based on 2017 to 2019 data.

Table 6-1. PWEI Results for Missouri CBSAs		
calculated using 2019 population estimates		
and 2017 NEI SO2 emissions		
CBSA	**PWEI**	**Required Number of SO2 Monitors**
Kansas City	20,939	1
St. Louis	188,320	2
Fayetteville-Springdale-Rogers	1,367	0
Springfield	1,635	0
Joplin	224	0
Columbia	282	0
Jefferson City	117	0
St. Joseph	70	0
Cape Girardeau	69	0
Maryville	4	0
Warrensburg	4	0
Marshall	1	0
Sedalia	8	0
Branson	62	0
Kirksville	5	0
Moberly	410	0
Lebanon	7	0
Mexico	1	0
Fort Leonard Wood	7	0
Rolla	8	0
West Plains	12	0
Fort Madison-Keokuk	58	0
Quincy	67	0
Hannibal	33	0
Farmington	11	0
Poplar Bluff	8	0
Sikeston	182	0
Kennett	1	0
PWEI=population*SO2(tpy)/1,000,000		
PWEI $\geq$ 1,000,000: 3 monitors		
1,000,000 > PWEI $\geq$ 100,000: 2 monitors		
100,000 > PWEI $\geq$ 5,000: 1 monitor		

6.2 SO_2 Monitoring Results in Missouri

The current SO_2 monitoring network is shown on the map in Figure 6-1. Table 6-2 and Figure 6-2 show the SO_2 design values measured at Missouri sites in recent years. Only two of the sites near the Magnitude 7 Metals facility exceeded the NAAQS for the most recent 3-year period, 2017 to 2019. The Department is working with that facility to reduce SO_2 emissions.

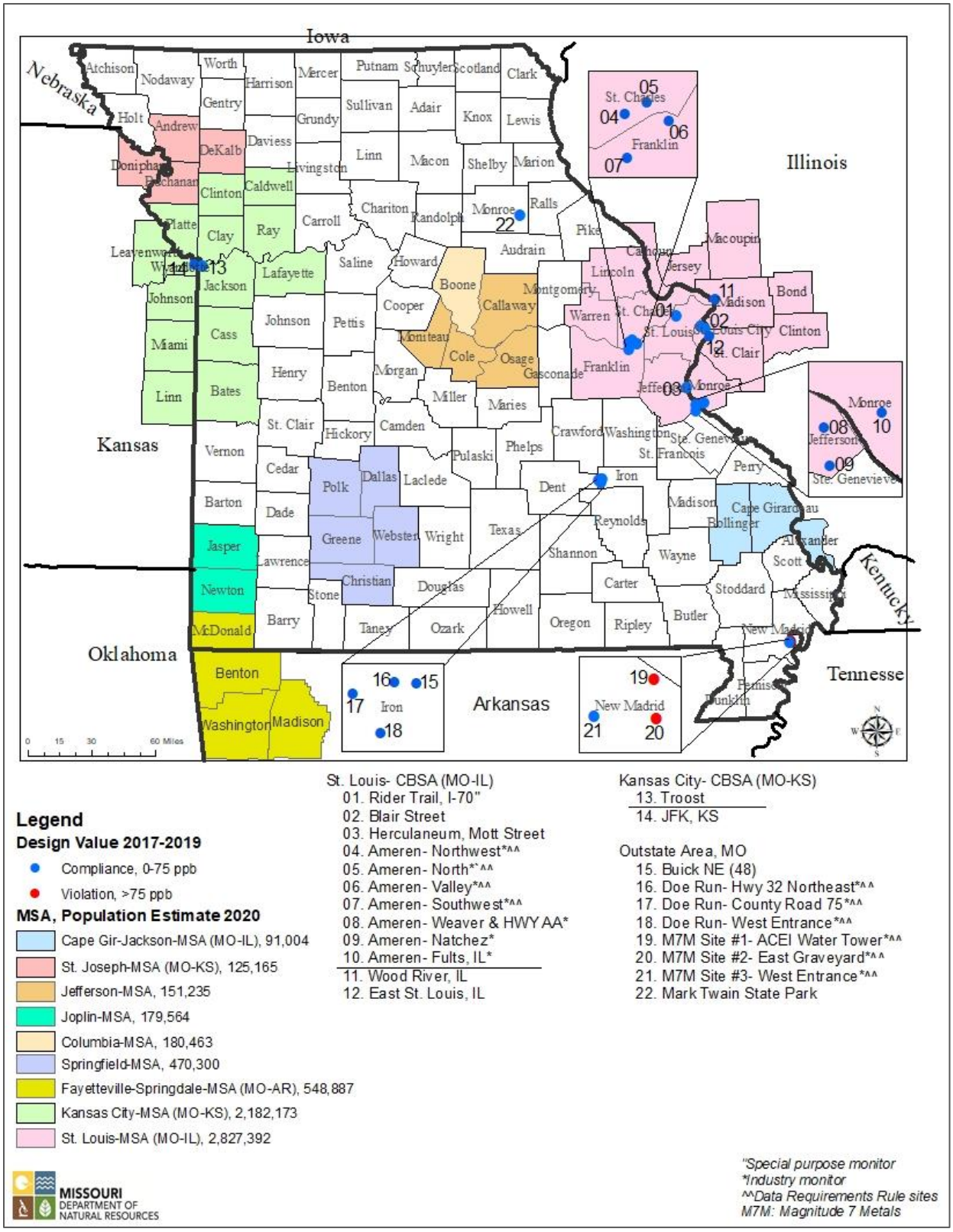


Figure 6-1. Missouri SO_2 Monitoring Network, 2020

Table 6-2

SO2 Design Values (3-year average of the 99th percentile 1-hour average in ppb)					
(Yellow highlight indicates exceedance of NAAQS)					
State	**13-15**	**14-16**	**15-17**	**16-18**	**17-19**
South Charleston	26	17	-	-	-
Buick NE	60	46	44	48	48
Troost	141	92	57	11	10
Herculaneum, Mott Street	66	23	23	14	14
Mark Twain State Park	8	7	5	5	4
Rider Trail, I-70	-	-	-	14	14
Blair Street	36	25	15	10	10
Margaretta	19	16	12	12	-
Industrial	**13-15**	**14-16**	**15-17**	**16-18**	**17-19**
Labadie-Valley	-	-	27	28	28
Rush Island-Weaver & Hwy AA	-	-	23	25	21
Rush Island-Natchez	-	-	23	21	21
Labadie-Northwest	-	-	25	22	19
Rush Island-Fults	-	-	-	-	19
James River-South	25	17	-	-	-
Labadie, North	-	-	-	-	29
Labadie, Southwest	-	-	-	-	24
M7M Site #1 AECI Water Tower	-	-	-	-	202
M7M Site #2 East Graveyard	-	-	-	-	268
M7M Site #3 West Entrance	-	-	-	-	47
Doe Run Buick- County Road 75	-	-	-	-	39
Doe Run Buick- Hwy 32 NE	-	-	-	-	50
Doe Run Buick- West Entrance	-	-	-	-	42

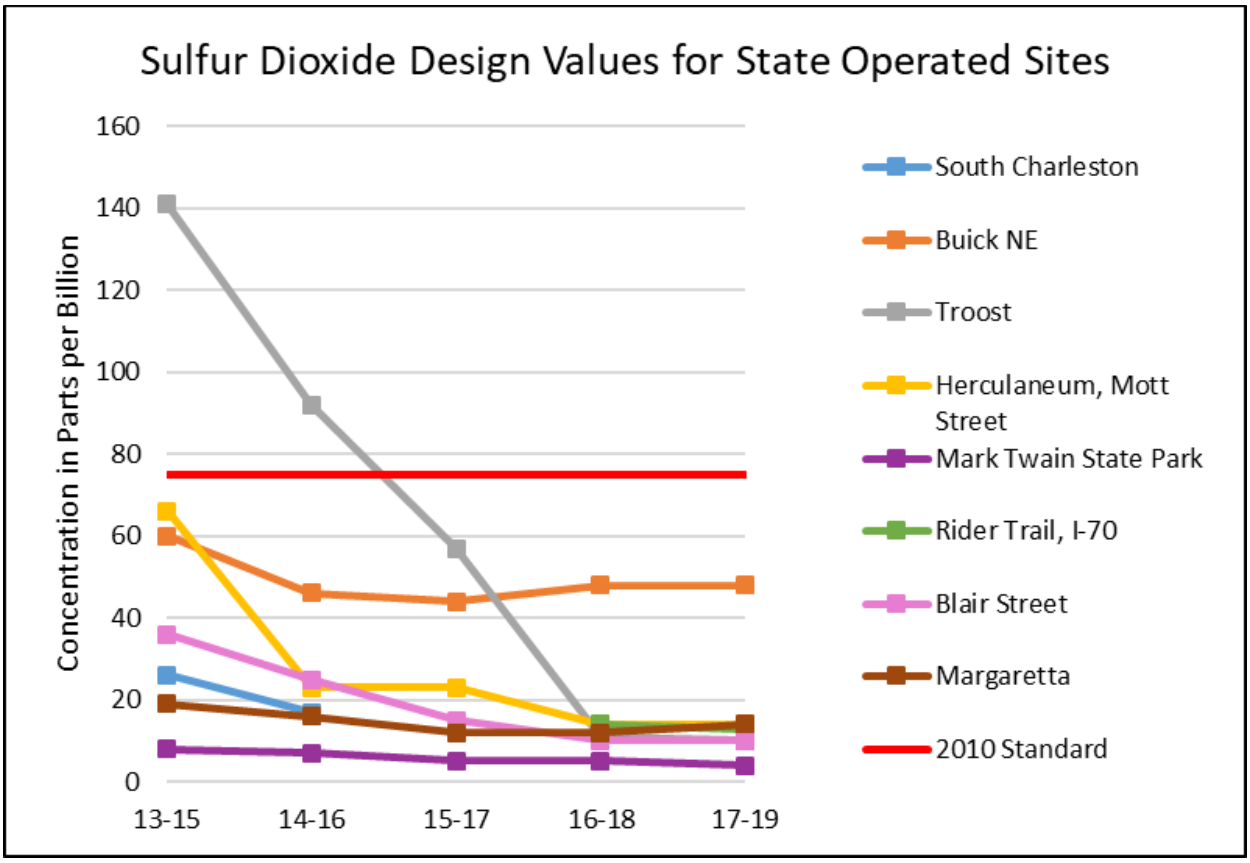


Figure 6-2a. Sulfur Dioxide Design Values, State Operated Sites

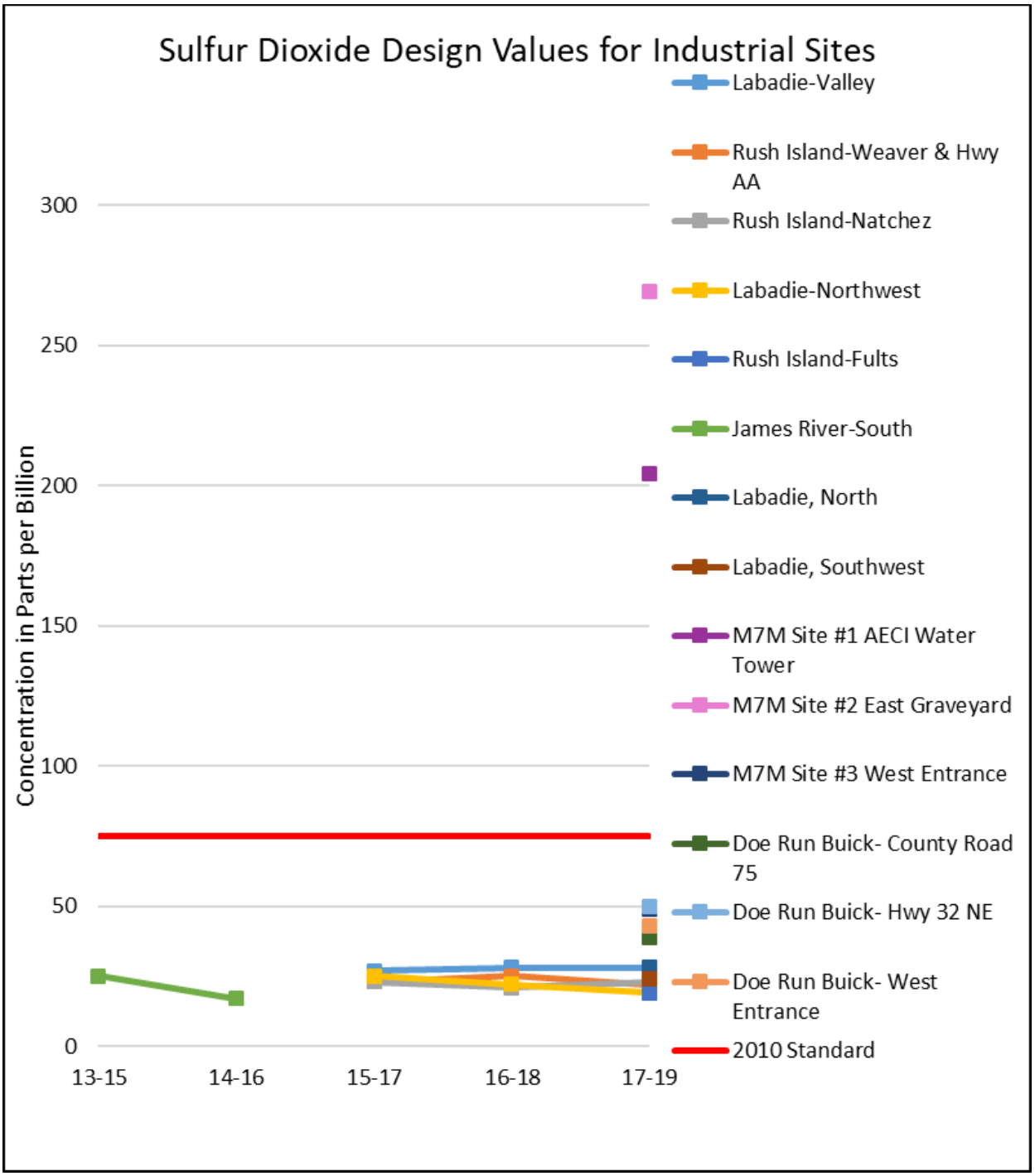


Figure 6-2b. Sulfur Dioxide Design Values, Industrial Sites

6.3 SO_2 Emissions

Fossil fuel combustion at electric generating stations (47% of total emissions nationally) and other industrial facilities (17% of total emissions nationally) are the predominant sources of SO_2 emissions, based on EPA emissions inventory data. Other sources include other industrial processes and fuel combustion by mobile sources (motor vehicles, locomotives, ships and off-road equipment). Figures 6-3 and 6-4 show the locations and relative size of SO_2 emission point sources in Missouri (based on the 2018 inventory) and the area source SO_2 by county (for 2014). Total SO_2 emissions from identified point sources were 111,417 tons in 2018. The area emissions are relatively small in comparison to those from point sources, totaling less than 1,000 tons (2016) statewide.

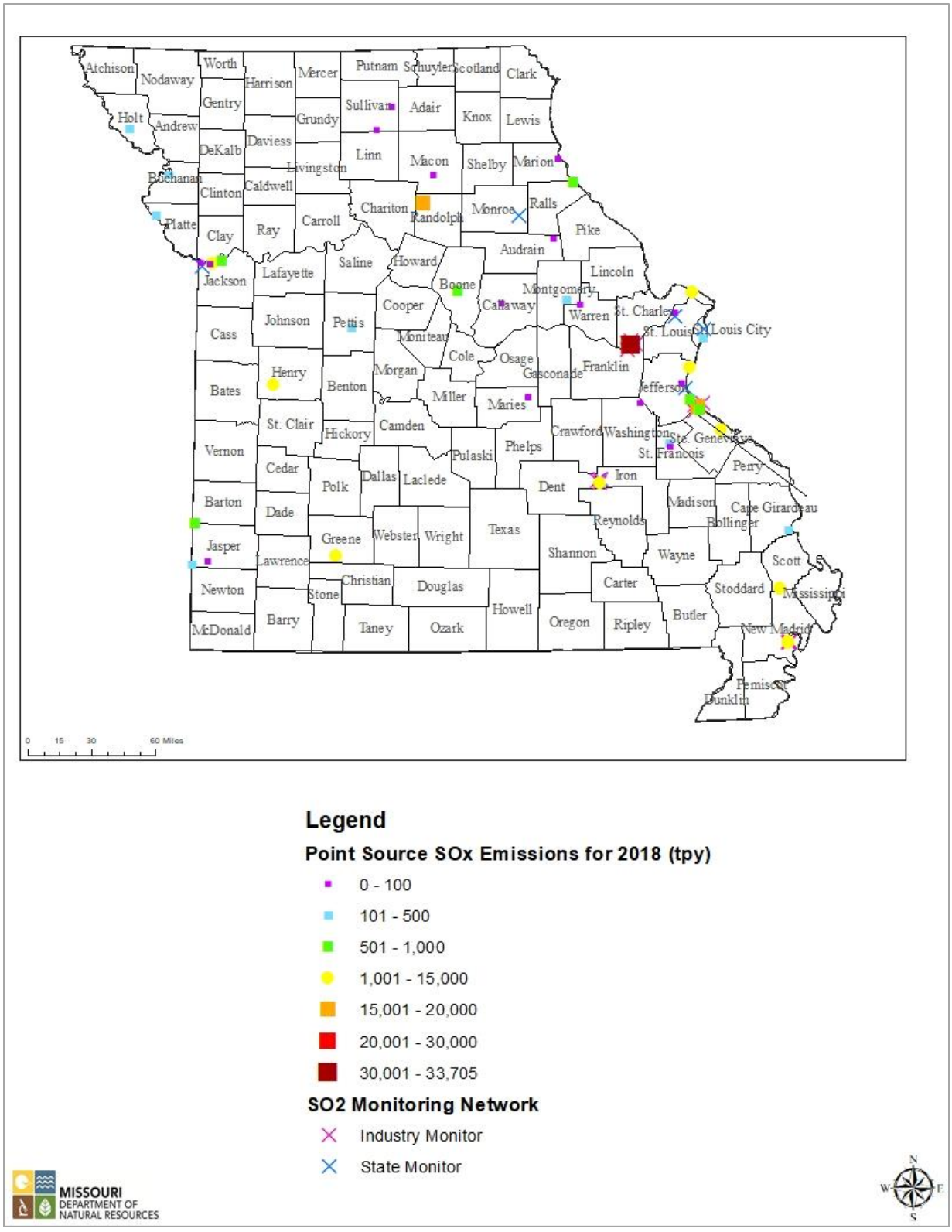


Figure 6-3. 2018 Statewide SO_2 Point Source Emissions and the 2020 SO_2 Monitoring Network

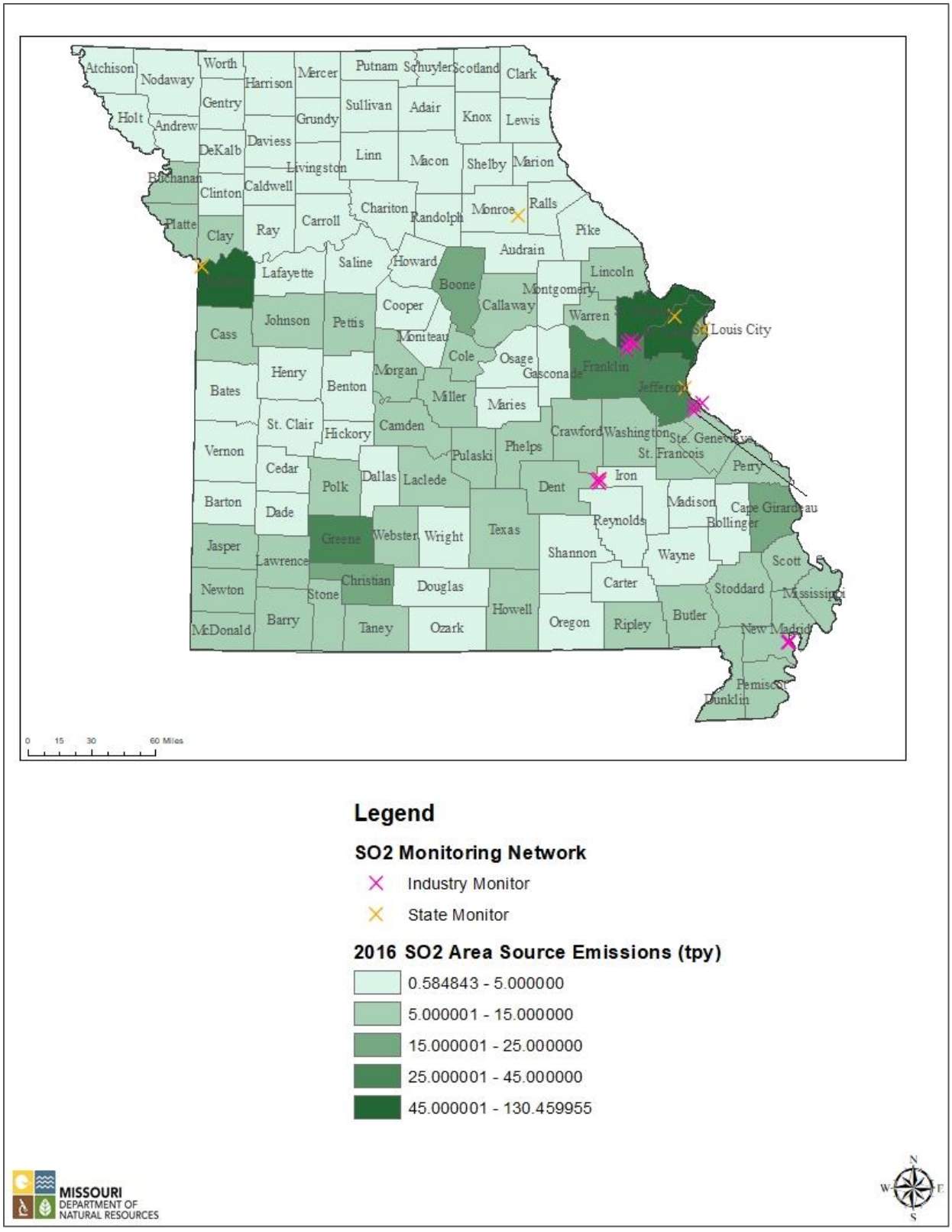


Figure 6-4. 2016 Statewide SO_2 Area Source Emissions and the 2020 Monitoring Network

6.4 Evaluation of the SO_2 Monitoring Network

The Troost site is critical because it is the only SO_2 monitoring site in Kansas City, Missouri (the other Kansas City area SO_2 monitor is in Kansas), and it is also required as a part of the plan for the Jackson County nonattainment area. The Buick NE site is critical because it is source-oriented.

The NCore site at Blair Street in St. Louis is also judged to be critical because of the requirement for trace-level SO_2 measurement at all NCore sites and because of the PWEI requirement for two sites in the St. Louis area. The Mott Street site is also judged to be critical because a second St. Louis area site is necessary to meet the PWEI requirement. Further, the Mott Street site is critical in order to determine whether operations at the Doe Run Herculaneum facility (following shutdown of primary smelting) impact SO_2 air quality, and in order to assess the possible impact of other sources in the Jefferson County area. The Mark Twain State Park site is judged to be credible to critical because it meets the need for measurement of regional background SO_2 concentration.

SO_2 monitoring at the Rider Trail I-70 site, designated as special purpose monitoring, began in 2016 to evaluate SO_2 levels in the general area, in which there are several potential emission sources. Continued operation of this site is judged to be credible in order to continue to evaluate population exposure to SO_2 in the area.

Continued operation of the Labadie, Rush Island, Magnitude 7 Metals and Doe Run Buick industrial sites is critical at least in the near term, because of their source-orientation, and because these sites may not be discontinued without EPA approval.

7.0 Nitrogen Dioxide Network Assessment

7.1 Introduction: Nitrogen Dioxide Standards and Monitoring Requirements

The current primary National Ambient Air Quality Standards (NAAQS) for nitrogen dioxide (NO_2) is 100 ppb. The form of the standard is the 3-year average of the 98th percentile of annual daily maximum 1-hour averages. There is also a primary and secondary NAAQS set at an annual average of 53 ppb. The NAAQS are listed in the EPA NAAQS Table on the internet.

Minimum NO_2 monitoring requirements (40 CFR Part 58, Appendix D) include:

1. Near-road: At least one monitor near a major road in any CBSA with population greater than or equal to 1 million people. A second monitor near a major road in CBSAs with either population greater than or equal to 2.5 million or one or more segments with an annual daily traffic count greater than or equal to 250,000 vehicles.
2. Community-wide: A minimum of one monitor in any CBSA with population greater than or equal to 1 million people.
3. Susceptible and vulnerable communities: 40 additional NO_2 monitors to be sited nationally by the EPA Regional Administrators with states' assistance.

7.2 NO_2 Monitoring Results in Missouri

The current NO_2 monitoring network is shown on the map in Figure 7-1. Table 7-1 and Figure 7-2 show the NO_2 one-hour design values measured at Missouri sites in recent years. Table 7-2 and Figure 7-3 show the NO_2 annual design values. Both one-hour and annual design values are well below the NAAQS at all sites.

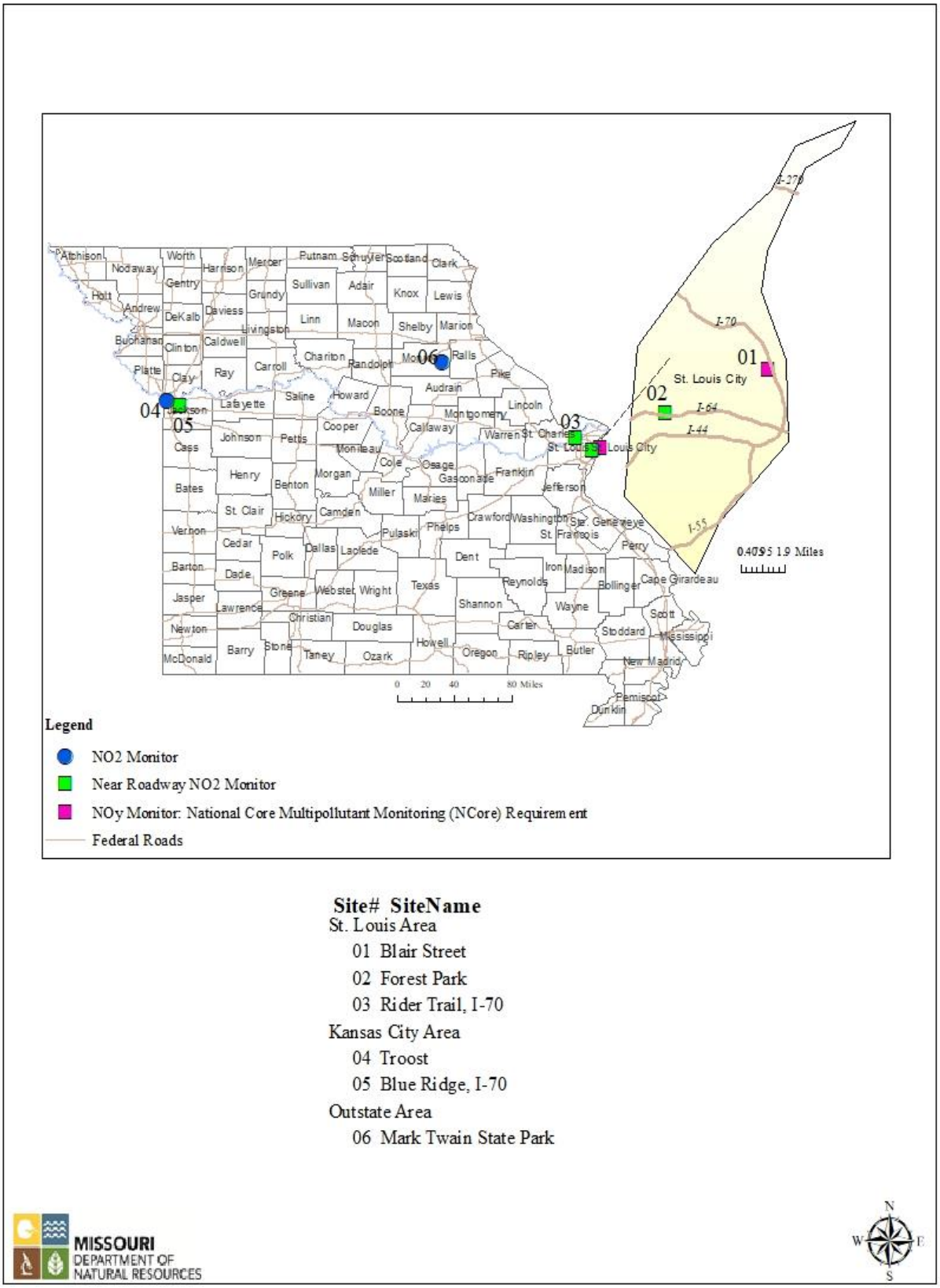


Figure 7-1. Statewide NO_2 Monitoring Network, 2020

Table 7-1

NO2 Design Values (3-year average of the 98th percentile 1-hour average in ppb)					
	13-15	**14-16**	**15-17**	**16-18**	**17-19**
Troost	51	50	49	47	47
Blue Ridge, I-70	44	43	43	42	43
Mark Twain State Park	-	9	9	8	9
Rider Trail, I-70	-	-	42	41	40
Blair Street	44	45	45	46	46
Margaretta	47	45	45	45	-
Forest Park, I-64	49	47	45	45	45

Table 7-2

NO2 Design Values (annual average in ppb)					
	2015	**2016**	**2017**	**2018**	**2019**
Troost	13.35	12.73	11.77	11.52	10.55
Blue Ridge, I-70	12.4	11.41	11.34	10.75	9.63
Mark Twain State Park	1.15	1.18	1.87	2.07	1.93
Rider Trail, I-70	12.59	11.86	10.18	9.84	9.27
Blair Street	13.25	11.79	11.29	11.17	10.04
Margaretta	10.76	10.42	9.48	9.99	-
Forest Park, I-64	12.75	11.42	10.95	11.09	9.58

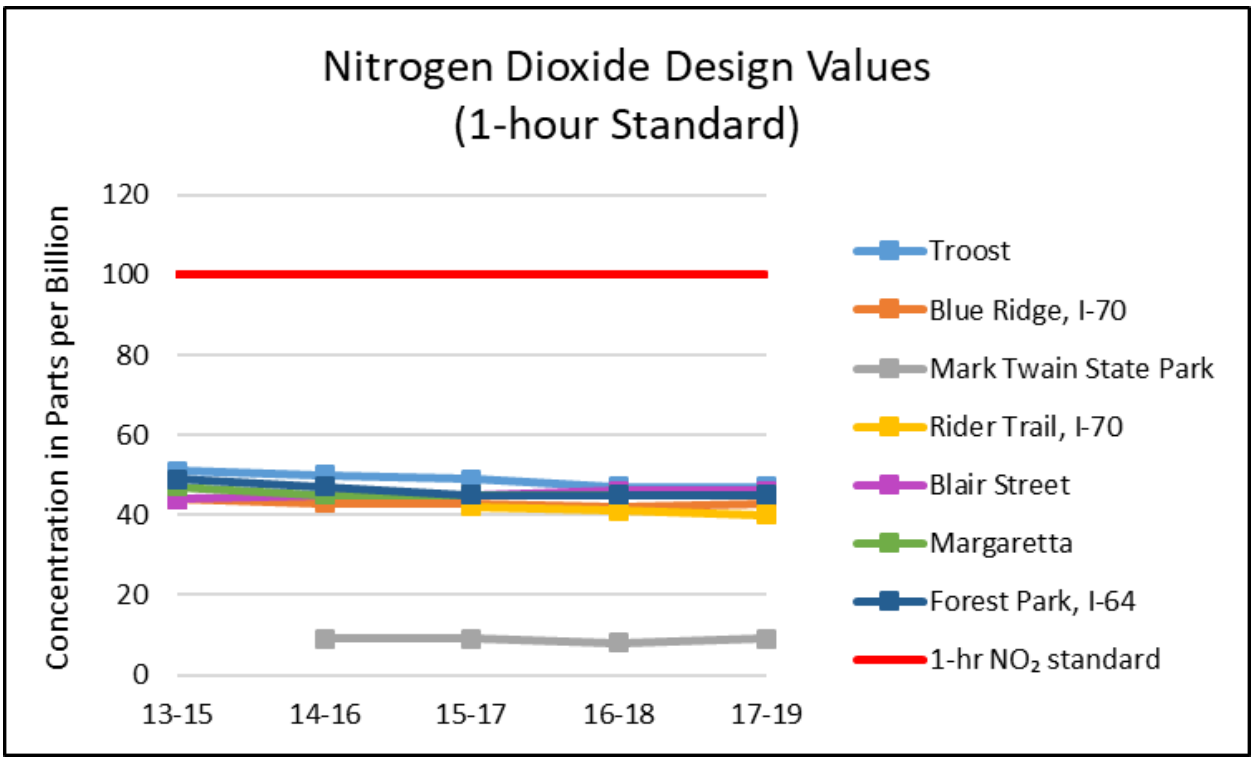


Figure 7-2. Nitrogen Dioxide Design Values, 1-hour Standard

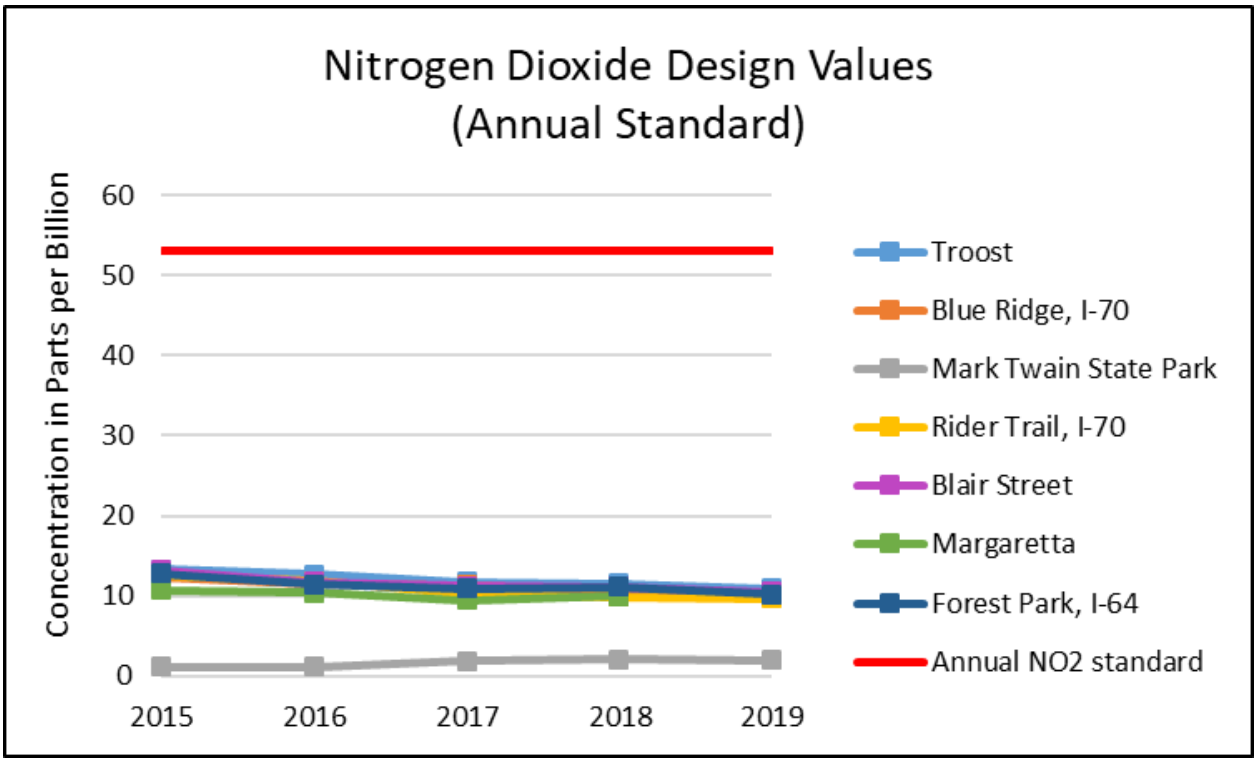


Figure 7-3. Nitrogen Dioxide Design Values, Annual Standard

7.3 NO_X Emissions

Nitrogen oxides (NO_X) are emitted from a wide variety of source types; point (electricity generating units and other stationary combustion sources), mobile (motor vehicles) and low level area sources. Each of these categories is discussed in the following sections.

7.3.1 Point Source NO_X Emissions

Statewide 2018 point sources with their respective emissions are presented in Figure 7-4. As shown in the figure, some of the larger sources are located within the boundaries of the St. Louis, Kansas City and Springfield urban cores. In addition, areas of higher concentrations of relatively smaller sources are located within these boundaries, especially in St. Louis and Kansas City. Impacts from these sources on the areas could be significant.

Some large sources are located outside the urban cores, especially along the Missouri and Mississippi rivers. A relatively large concentration of point sources is also noted in the southwest part of the state, which is a growing area in terms of population. New Madrid (New Madrid County) and Thomas Hill Energy (Randolph County) power plants are the first and second largest point sources in Missouri, respectively. However, neither plant is located within the urban core or metropolitan statistical areas.

Statewide point source NO_X emissions have decreased significantly over the last 10 to 20 years, but have been relatively constant over about the last five years. Total point source NO_X emissions in 2018 were 77,000 tons.

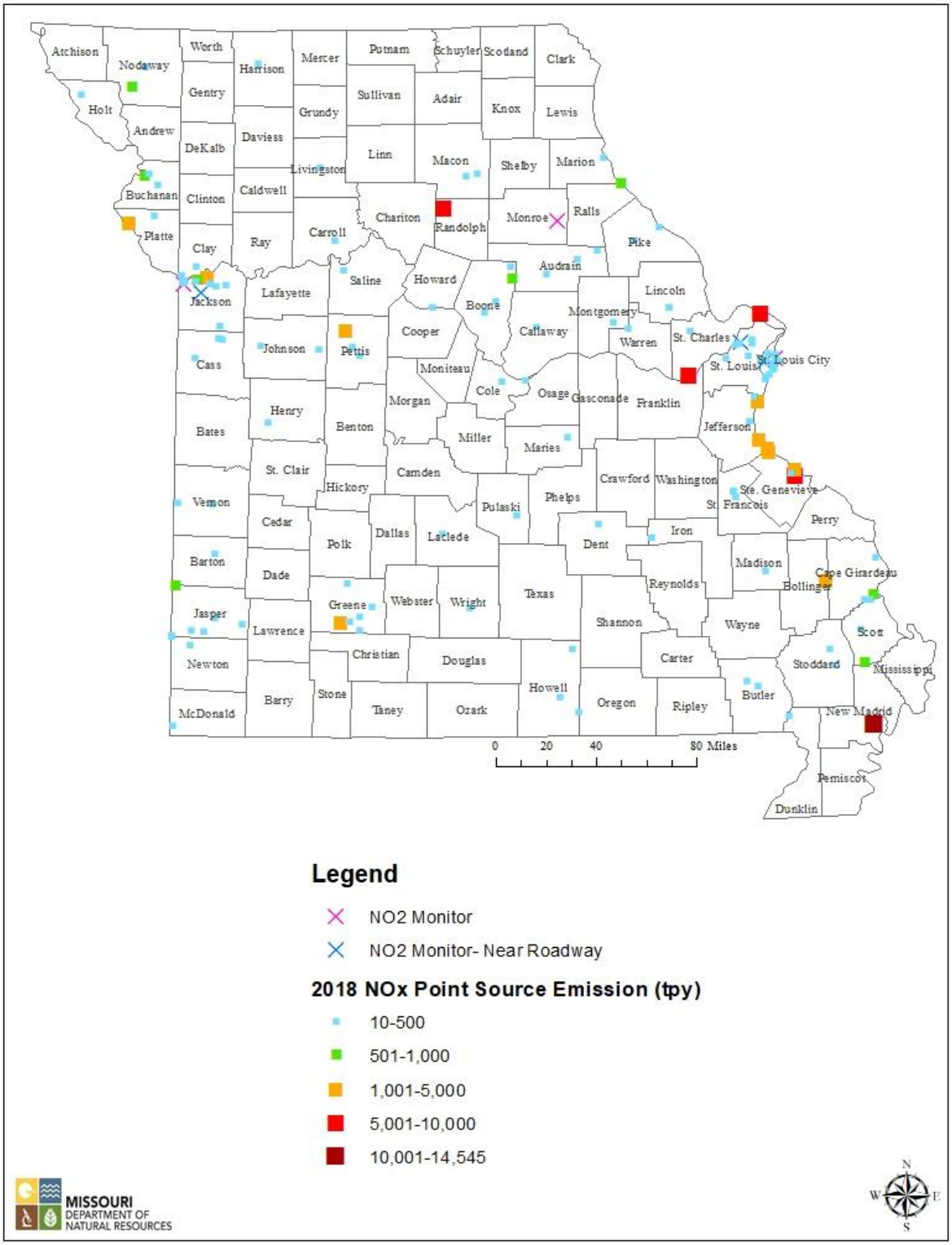


Figure 7-4. 2018 Statewide NO_x Point Source Emissions and the 2020 NO_2 Monitoring Network

7.3.2 Mobile Source NO_X Emissions

Onroad mobile source NO_X emissions, like CO emissions (discussed in Section 5), are highest in areas with the highest traffic count as shown in Figures 5-4 and 5-5. Statewide mobile source NO_X emissions (on--road and off-road) totaled about 144,000 tons per year in 2016.

7.3.3 Area Source NO_X Emissions

Figure 7-5 shows the 2016 area source emissions. Area source emissions are highest in the St. Louis and Kansas City metropolitan areas and also somewhat elevated in the Springfield area. Area source emissions are less significant than point and mobile source emissions. Statewide area source emissions total about 39,000 tons per year.

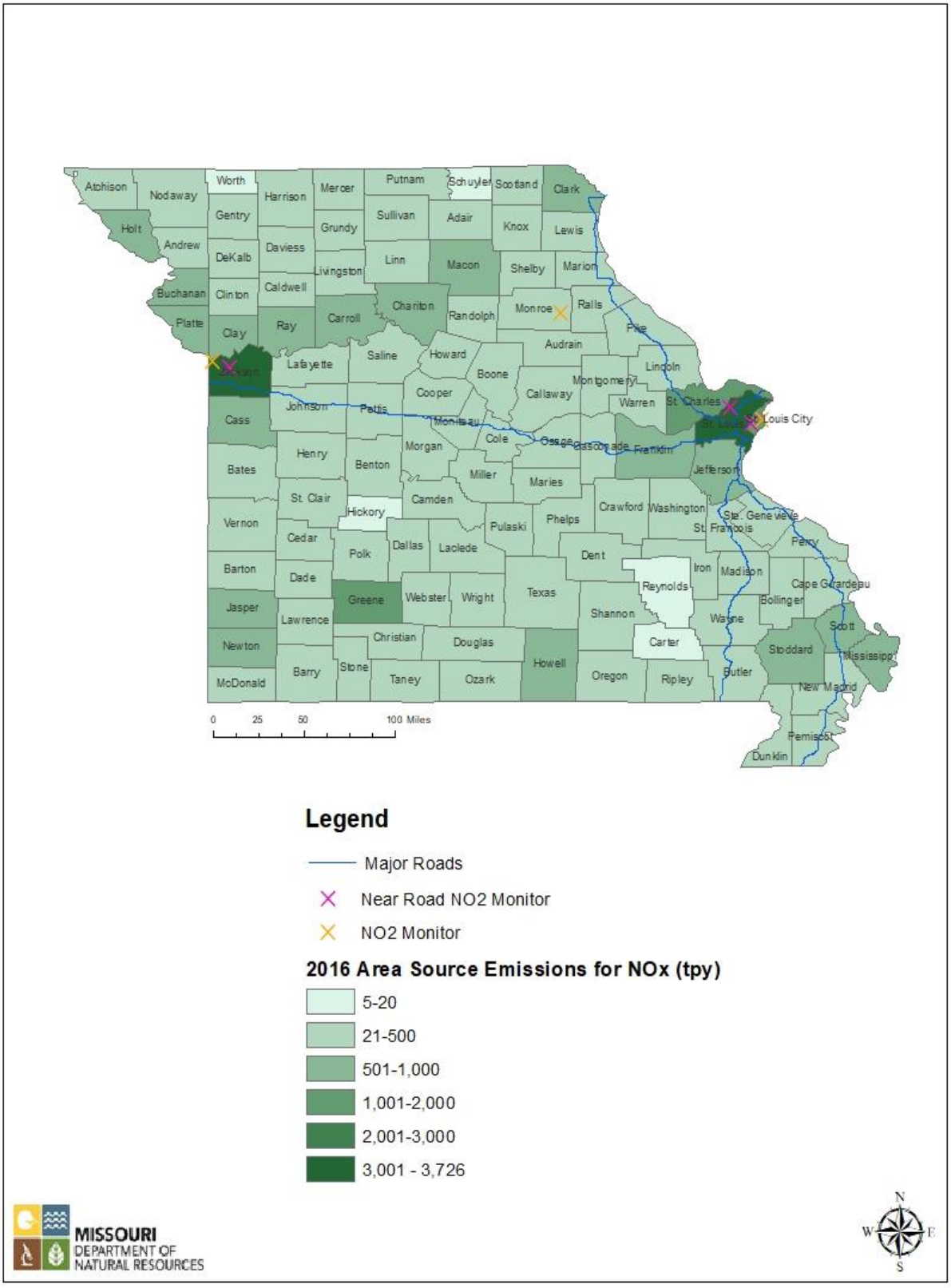


Figure 7-6. 2016 Missouri Statewide Area Source NO_X Emissions and the 2020 NO_2 Monitoring Network

7.4 Evaluation of the NO_2 Monitoring Network

None of the current NO_2 monitoring sites has shown a violation of the NAAQS in recent years. However, the Blair Street and Troost sites are judged to be critical because they are located in part to evaluate population exposure within the St. Louis and Kansas City urban areas. The Margaretta site was previously identified as specifically meeting the requirement for monitoring the exposure of susceptible and vulnerable populations, but the Blair Street site now has this designation based on the 2018 Monitoring Network Plan, which was approved by EPA. The Forest Park, Blue Ridge I-70 and Rider Trail sites are also critical because they meet the requirement for near-road monitoring. The Mark Twain State Park site is judged to be credible to critical because it meets the need for measurement of regional background NO_2 concentration.

In addition to the NO_2 monitoring described above, NO_Y (NO_Y represents total reactive nitrogen oxides) monitoring is also being done at the Blair Street NCore site, and true NO_2 monitoring (either NO_2 monitoring using a photolytic NO_2 to NO converter or direct NO_2 monitoring using a cavity attenuated phase shift (CAPS) instrument) will be required as a part of the Photochemical Assessment Monitoring Stations (PAMS) program by June 1, 2021. This monitoring is also critical, because it is required at all NCore and PAMS sites, respectively.

8.0 PM_{10} Network Assessment

8.1 Introduction: PM_{10} Standards and Monitoring Requirements

The current primary and secondary PM_{10} NAAQS is 150 µg/m^3. The standards are met when the expected number of days with a 24-hour average concentration above 150 µg/m^3 does not exceed one on average over a 3-year period, as determined in accordance with 40 CFR Part 50, Appendix K. Therefore, the design value for PM_{10} is expressed as a number of days, not as a concentration. The NAAQS are listed in the EPA NAAQS Table on the internet. The PM_{10} NAAQS was reviewed and not changed in 2012 and reviewed and proposed to not be changed in 2020.

There are minimum monitoring requirements for PM_{10} in each MSA. 40 CFR 58 Appendix D outlines the requirements as presented below in Table 8-1. The minimum requirements are based on the MSA population and the monitored PM_{10} concentrations relative to the NAAQS.

Table 8-1 PM_{10} Minimum Monitoring Requirements
(Approximate Number of Stations per MSA)[1]

Population category	High concentration[2]	Medium concentration[3]	Low concentration[4,5]
>1 million (St. Louis and Kansas City)	6–10	4–8	2–4
500,000–1 million	4–8	2–4	1–2
250,000–500,000 (Springfield)	3–4	1–2	0–1
100,000–250,000	1–2	0–1	0

[1]Selection of urban areas and actual numbers of stations per area will be jointly determined by EPA.
[2]High concentration areas are those for which ambient PM_{10} data show ambient concentrations exceeding the PM_{10} NAAQS by 20% or more.
[3]Medium concentration areas are those for which ambient PM_{10} data show ambient concentrations exceeding 80% of the PM_{10} NAAQS.
[4]Low concentration areas are those for which ambient PM_{10} data show ambient concentrations less than 80% of the PM_{10} NAAQS.
[5]These minimum monitoring requirements apply in the absence of a design value.

8.2 PM_{10} Monitoring Results in Missouri

The current PM_{10} monitoring network is shown on the map in Figure 8-1. There are three sites in the St. Louis area, two in the Kansas City area, one in Springfield and three in the remainder of the state. Table 8-2 and Figure 8-2 show the PM_{10} design values measured at Missouri sites in recent years. The design values have been 1.0 or less at all but two of the sites. One of the two sites has, currently, a design value less than 1.0. The two sites are located in areas near industrial facilities whose operations may release PM_{10} into the air. The Air Pollution Control Program Planning Section and Compliance and Enforcement Section are working with facilities in both of these areas to reduce PM_{10} emissions so these locations continue to meet the standard.

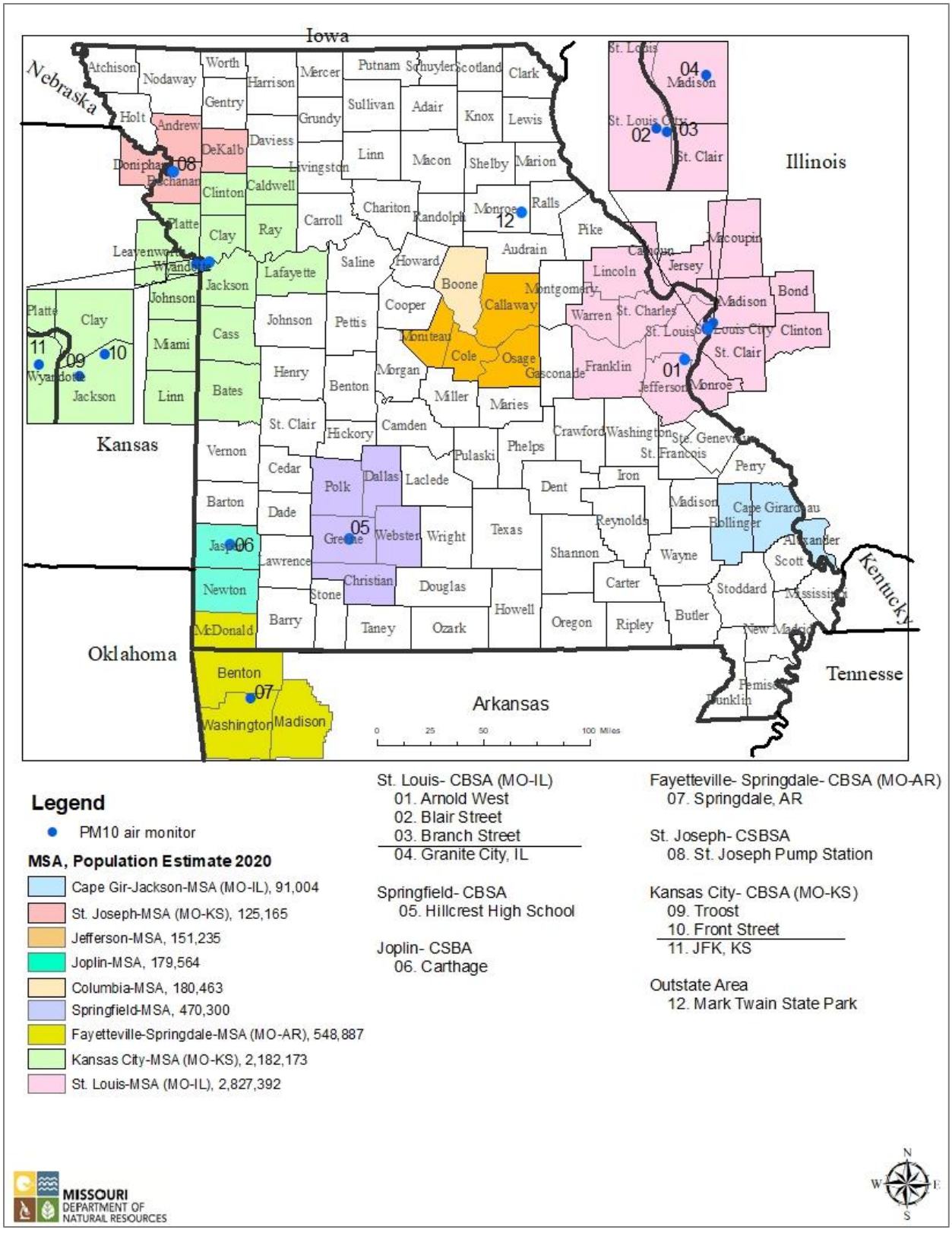


Figure 8-1. 2020 Statewide PM_{10} Monitoring Network

Table 8-2

PM10 Design Values (expected number of days per year that 150 µg/m^3 is exceeded)					
	13-15	**14-16**	**15-17**	**16-18**	**17-19**
St. Louis Area					
Blair Street	0.0	0.0	0.0	0.0	0.0
Branch Street	1.0	0.7	0.3	0.3	0.3
Arnold West	-	0.0	0.0	0.0	0.0
Margaretta**	0.0	0.0	0.0	0.0	-
South Broadway*	-	-	-	-	-
Forest Park*	-	-	-	-	-
Kansas City Area					
Troost	0.0	0.0	0.0	0.0	0.0
Front	0.0	0.0	0.0	0.0	0.0
Liberty*	-	-	-	-	-
Richards Gebaur- South*	-	-	-	-	-
Blue Ridge, I-70*	-	-	-	-	-
Springfield Area					
Hillcrest High School	-	0.0	0.0	0.0	0.0
Outhstate Area					
Mark Twain State Park	0.0	0.0	0.0	0.0	0.0
Carthage	0.3	0.7	0.3	0.3	0.0
St. Joseph Pump Station	0.0	0.0	0.0	0.0	0.0
El Dorado Springs*	-	-	-	-	-
*The only PM10 instruments at these sites are designated as Federal Equivalent Method (FEM)					
The PM10 FEM is not being reported to EPA. Only PM10 LC at those sites is being reported.					
Operated for AQI determination, not NAAQS compliance					
**Margaretta discontinued monitoring December 31, 2018.					

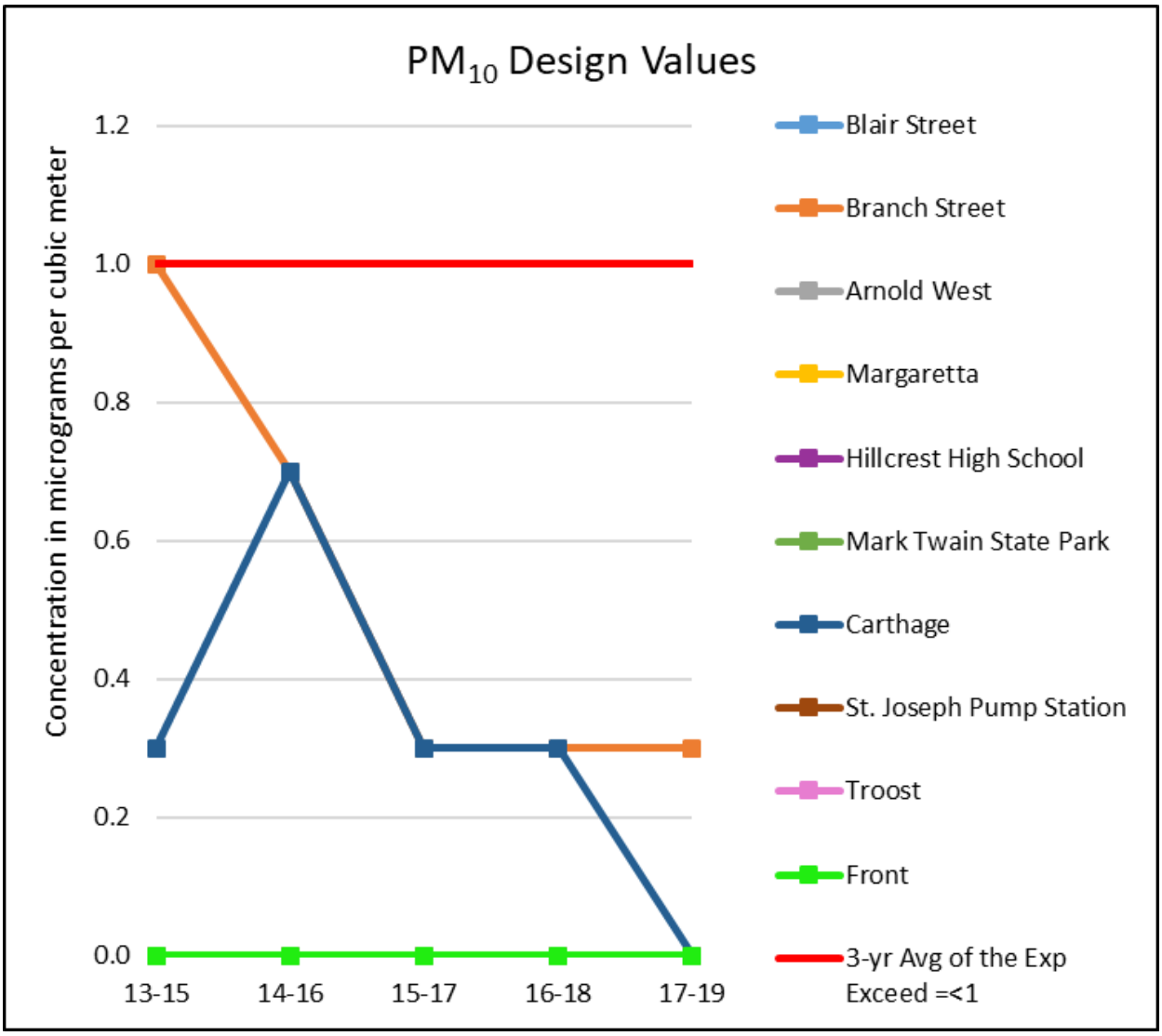


Figure 8-2. PM_{10} Design Values

Table 8-3 and Figure 8-3 show the maximum 24-hour PM_{10} concentrations at Missouri sites in recent years. These results are presented for comparison to the monitoring requirements listed in Table 8-1 (discussed in Section 8.4 below). Only the two sites near industrial facilities discussed above show first maximum concentrations greater than 80% of the level of the standard (medium concentration in Table 8-1).

Table 8-3

Maximum 24-hour PM10 Concentrations in µg/m^3					
	2015	**2016**	**2017**	**2018**	**2019**
Blair Street	45	39	38	60	79
Branch Street	117	93	161	95	121
Arnold West	39	30	78	53	27
Margaretta	67	63	54	57	-
Hillcrest High School	77	50	51	40	47
Mark Twain State Park	45	39	37	29	30
Carthage	149	173	70	142	135
St. Joseph Pump Station	85	78	101	88	110
Troost	51	72	71	60	89
Front	149	89	133	65	80

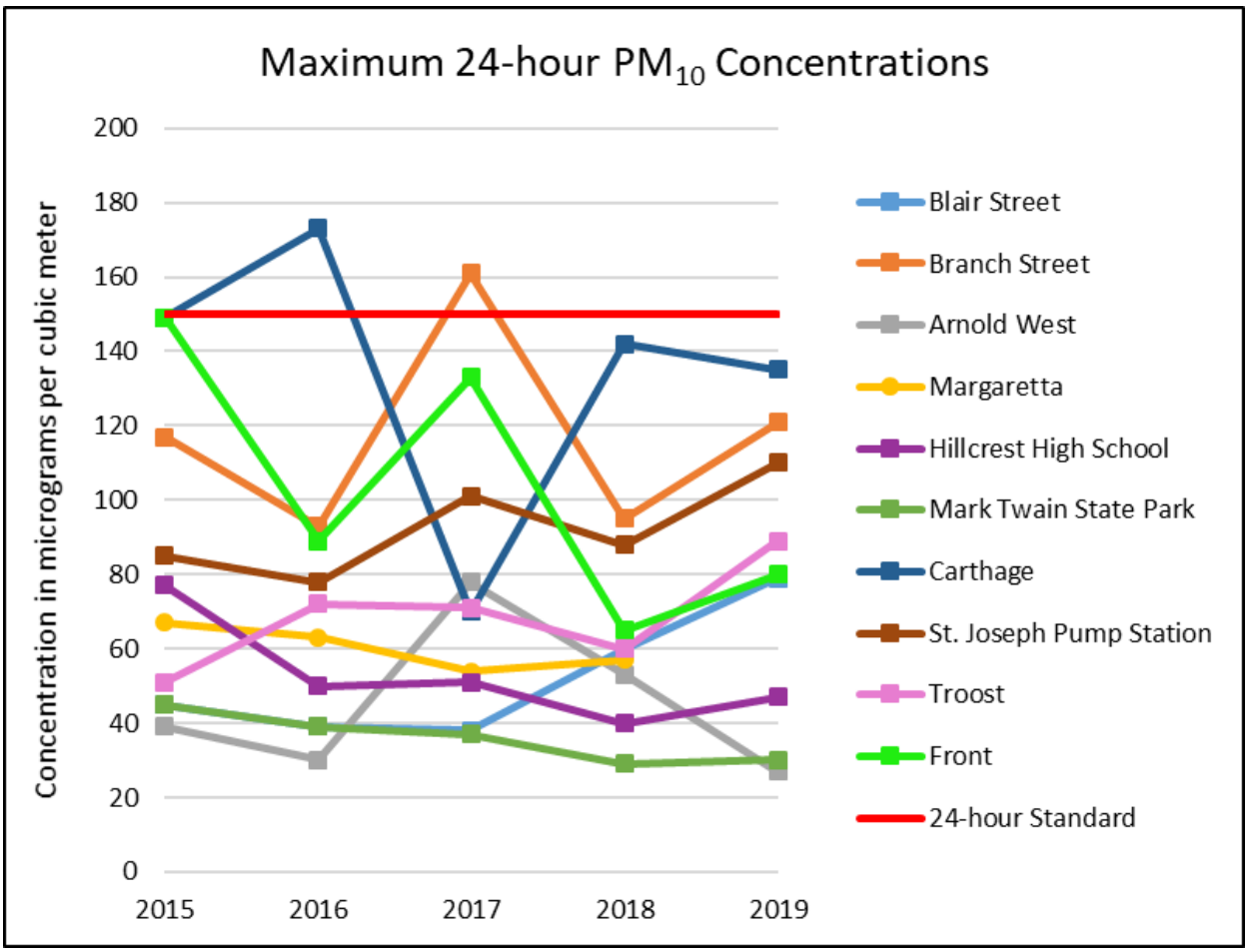


Figure 8-3. Maximum 24-Hour PM_{10} Concentrations

8.3 PM_{10} Emissions

8.3.1 Point Sources

Statewide locations of the 2018 PM_{10} point sources with emissions greater than or equal to 10 tpy in the Missouri Emissions Inventory System (MoEIS) are presented in Figure 8-4. As expected, high concentrations of sources are in the metropolitan areas of St. Louis, Kansas City and Springfield. Table 8-4 shows statewide MoEIS trends for facilities with at least 0.5 tpy.

Table 8-4. Statewide PM_{10} Point Source Emission Trends, 2014-2018

Year	2014	2015	2016	2017	2018
Yearly Total Emission (tpy)	17,220	15,025	12,710	13,004	12,968

8.3.2 Mobile Sources

On-road mobile source PM_{10} emissions, like CO emissions (discussed in Section 5), are highest in areas with the highest traffic count as shown in Figures 5-4 and 5-5. Statewide mobile source PM_{10} emissions totaled about 6,000 tons per year in 2016.

8.3.3 Area Sources

Area source emissions are shown by county in Figure 8-5. Area source emissions are greatest in the areas of St. Louis, Springfield and Kansas City. Area sources correlate somewhat with population. 2016 Area sources of PM_{10} totaled about 541,000 tons per year.

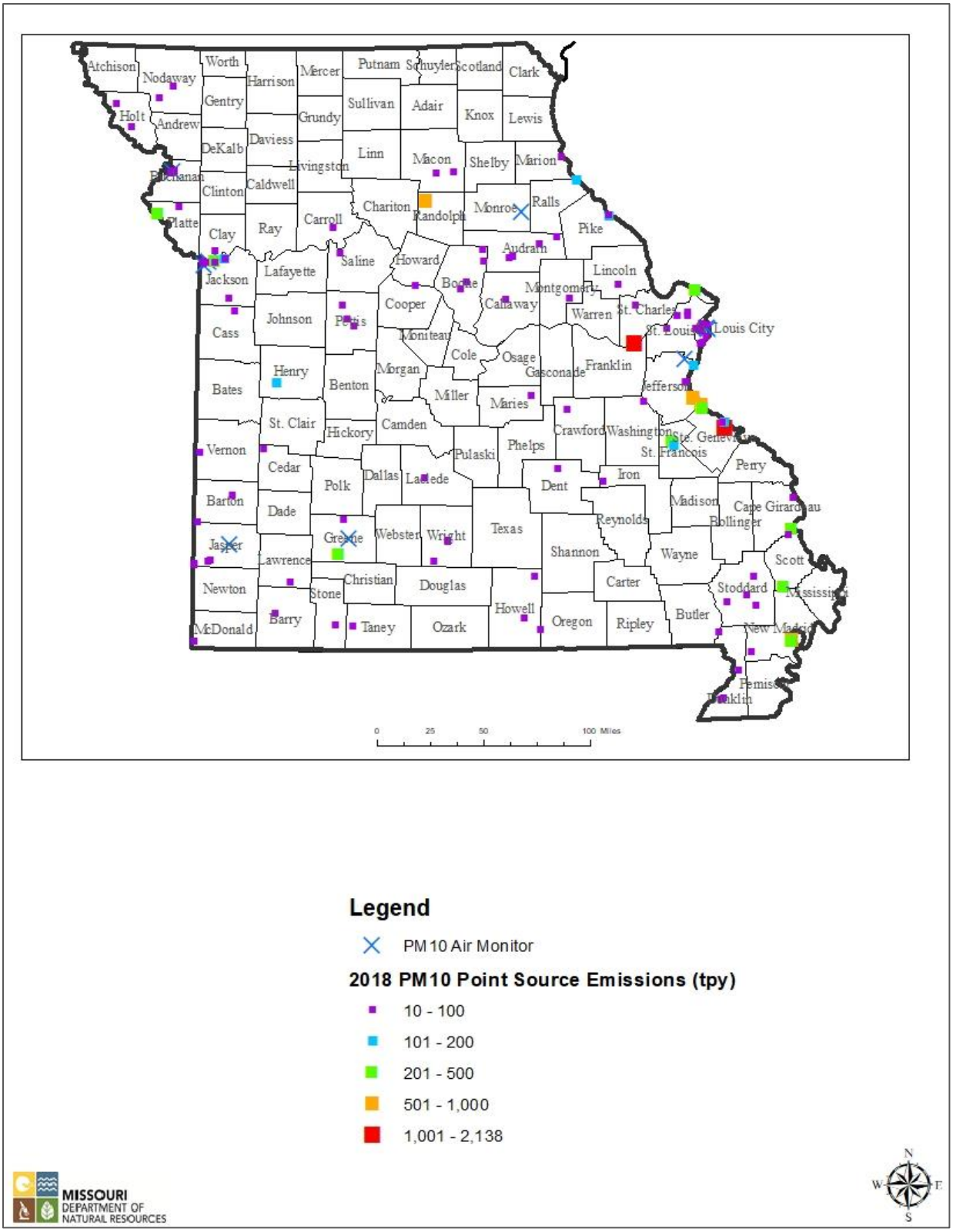


Figure 8-4. 2018 Statewide PM_{10} Point Source Emissions and the 2020 PM_{10} Monitoring Network

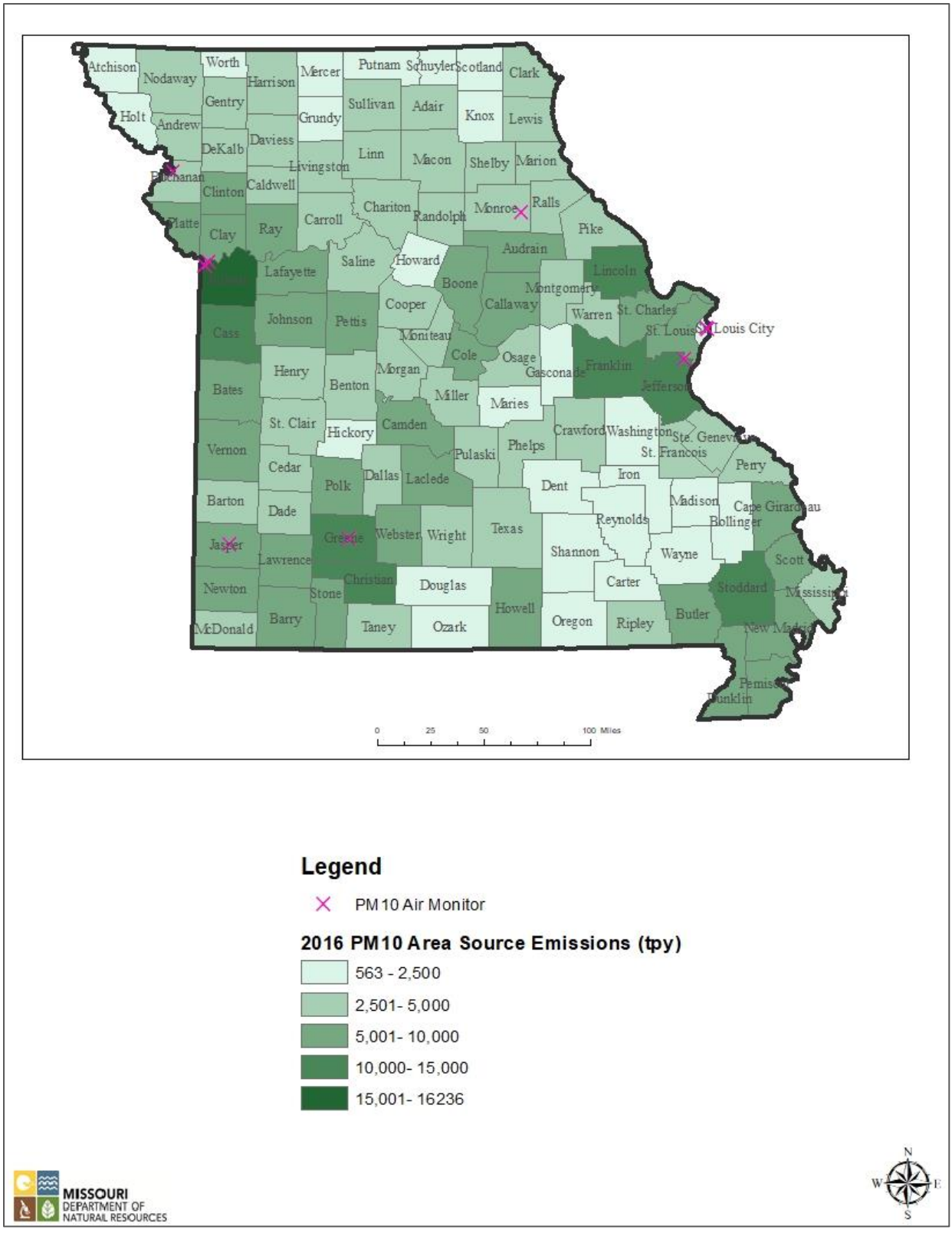


Figure 8-5. 2013 PM_{10} Area Source Emissions and the 2015 Statewide PM_{10} Monitoring Network

8.4 Evaluation of the PM_{10} Monitoring Network

There are nine sites currently monitoring PM_{10} concentrations in Missouri. There are three sites in the St. Louis area, two in the Kansas City area, one in Springfield and three in the remainder of the state (see Figure 8-2).

As shown in Table 8-3 and Figure 8-3, only two of the existing sites (Branch Street and Carthage), located in industrial areas with identified local sources, show maximum 24-hour concentrations greater than 80% of the level of the standard. The middle column of Table 8-1 (medium) is the one that applies in the St. Louis area if the Branch Street site must be considered, requiring four to eight monitors. This number is more than met by the four Missouri sites plus sites in Illinois within the St. Louis metropolitan area. In Kansas City, the right column of Table 8-1 is the one that applies, requiring two to four sites, more than met by the three Missouri sites plus sites in Kansas.

PM_{10} sites are selected to represent one of the following scales:

1. Middle Scale: Defines the concentration typical of area up to several city blocks in size with dimensions ranging from about 100 meters to 0.5 kilometers.
2. Neighborhood Scale: Defines the concentrations within some extended area of the city that has relatively uniform land use with dimensions in the 0.5 to 4.0 kilometers.
3. Regional Scale: Defines usually a rural area of reasonably homogeneous geography without large sources, and extends from tens to hundreds of kilometers.

Branch Street is a source-oriented middle scale site that has shown exceedance of the standard in recent years. The site is located in an area with significant sources and is critical in evaluating possible short-term exposure and also for evaluating the effectiveness of control of emission control strategies.

Similarly, Carthage has shown exceedance of the standard in recent years, is located in an area with significant sources, is valuable in evaluating the effectiveness of control strategies and is therefore critical.

Low and stable PM_{10} concentrations have been monitored at Blair Street, located slightly downwind of the urban core and in a mixed residential/industrial area. Because Blair Street is an NCore site, this site is critical.

PM_{10} monitoring at the Forest Park and Blue Ridge near road sites will continue. These sites are not being used to determine NAAQS compliance, but the PM_{10} instruments at these sites were procured in order to evaluate emissions from mobile sources.

Arnold West is critical because it is generally upwind of the central St. Louis area, and because it contributes to meeting the requirement for four sites in the St. Louis area.

In the Kansas City area, the Front Street site, located in an area of significant intermodal freight traffic with potential for high particulate emissions, has shown maximum PM_{10} concentrations about two-thirds the level of the standard. Therefore, it is judged to be critical.

Troost is designated as an SPM site for PM_{10} but is judged to be credible to critical because it is providing information on the performance of the T640x instrument for both PM_{10} and $PM_{2.5}$ in the Kansas City area.

The Hillcrest High School site is judged to be critical because it is the only monitor in the Springfield area.

St. Joseph Pump Station has shown maximum concentrations about half to two-thirds of the level of the standard, and it is the only site in the St. Joseph area. This site is judged to be critical.

Mark Twain State Park is a regional scale site. It located far from the metropolitan areas and larger sources. It monitors rural (background) and regional concentrations for the state and is therefore a critical site.

9.0 Ozone Network Assessment

9.1 Introduction: Ozone Standards and Monitoring Requirements

The level of the current ozone (O_3) primary and secondary NAAQS is 0.070 ppm (70 ppb). The form of the standard is the three-year average of the annual fourth-highest daily maximum 8-hour concentration The NAAQS are listed in the EPA NAAQS Table on the internet.

Table 9-1 from 40 CFR, Part 58, Appendix D presents the minimum requirements for O_3 monitoring. States (or local agencies) must operate O_3 sites for various locations depending on the size of the area and typical O_3 peak concentration. The NCore sites are expected to complement the SLAMS O_3 data. Both SLAMS and NCore sites can be used to meet the network minimum requirements. The total number of O_3 sites necessary to meet basic O_3 monitoring objectives will generally include more sites than the required minimums in Table 9-1. The break point of 85% of the NAAQS is currently 0.0595 ppm.

Table 9-1. SLAMS Minimum O_3 Monitoring Requirements

MSA population[1,2]	Most recent 3-year design value concentrations ≥85% of any O_3 NAAQS[3]	Most recent 3-year design value concentrations <85% of any O_3 NAAQS[3,4]
>10 million	4	2
4–10 million	3	1
350,000–<4 million	2	1
50,000–<350,000[5]	1	0

[1]Minimum monitoring requirements apply to the metropolitan statistical area (MSA).
[2]Population based on latest available census figures.
[3]The O_3 National Ambient Air Quality Standards (NAAQS) levels and forms are defined in 40 CFR Part 50.
[4]These minimum monitoring requirements apply in the absence of a design value.
[5]Metropolitan statistical areas (MSA) must contain an urbanized area of 50,000 or more population.

One or more O_3 site(s) for each MSA must be designed to record the maximum concentration for that particular area. Network design must also consider other factors including geographic size, population density, complexity of terrain and meteorology, adjacent O_3 monitoring programs and air pollution transport from neighboring areas.

The basic O_3 monitoring objectives include:

- Public data reporting.
- Air quality mapping.

- NAAQS compliance.
- Understanding O_3-related atmospheric processes.

The monitoring season for O_3 monitoring in Missouri is from March through October of each year.

9.2 O_3 Monitoring Results in Missouri

9.2.1. Ozone Design Values

There are currently 22 sites that monitor O_3 in Missouri (Figure 9-1). Seven sites are in the St. Louis area, and five are in the Kansas City area. Ste. Genevieve County and the southeast areas each have one site. Two sites are located in Springfield, and there are six sites in other areas of the state.

These sites represent the following spatial scales defined in 40 **CFR**, Part 58, Appendix D:

1. Neighborhood: Defines the concentrations within some extended area of the city that has relatively uniform land use with dimensions in the range of 0.5 to 4.0 kilometers.
2. Urban: Defines the concentrations within an area of the city with dimensions of 4.0 to 50 kilometers.
3. Regional: Defines usually a rural area of reasonably homogeneous geography without large sources, and extends from tens to hundreds of kilometers.

Table 9-2 and Figures 9-2, 9-3, and 9-4 show the O_3 design values measured at Missouri sites in recent years. Yellow highlights in the table indicate design values that exceed the standard. Only one site exceeded the standard in the most recent three-year period (2017 to 2019).

St. Louis Area
As shown in Table 9-2 and Figure 9-2, West Alton was in violation of the standard for the most recent three-year period, and Orchard Farm, West Alton and Blair Street in the St. Louis area were in violation of the standard for the previous three-year period (2016 to 2018). The West Alton and Orchard Farm sites are located relatively downwind (see Section 3.0 and Appendix A) and at the exterior of the St. Louis metropolitan area. Blair Street is relatively close within the core of the urban area. Pacific and Arnold West are located southerly and generally upwind of the St. Louis urban core, not in the most prevalent wind direction. Foley, replaced by Foley West because of a change in property ownership, is located downwind but at a greater distance from the core of the metropolitan area.

The West Alton site is located about 16 miles north of the center of St. Louis between the Missouri and Mississippi Rivers and about seven miles northwest of their confluence. The West Alton area is relatively flat, with elevation about 420 to 430 feet above sea level. The area is subject to flooding when the water level in the rivers rises, and there was widespread flooding in the area during the spring and early summer in 2019. The site was inoperative from May 2 to 16 and May 22 to July 16, 2019, because it was removed to avoid damage due to flooding. The

Department has evaluated the days with missing O_3 measurement at West Alton based on temperature and on ozone concentrations measured at nearby sites. Based on this evaluation, 62 of the 72 missing days were not contributing to ozone concentrations above the level of the standard. Therefore, the data completeness requirement for the site was still met in 2019. However, because of its importance as the design value site for the St. Louis area, a cost estimate and plan are being developed for elevation of the West Alton monitoring site above the 2019 high water level while still meeting probe height requirements to minimize outages related to flooding in future years.

Kansas City Area

As shown in Table 9-2 and Figure 9-3, all of the sites in the Kansas City area were within the standard for the five most recent three-year periods. However, Trimble, Watkins Mill, Liberty and Rocky Creek, in the Kansas City area have violated the standard in the past. These four sites are located north and downwind relative to the central Kansas City and on the outskirts of the Kansas City metropolitan area. The Richards Gebaur South site is located generally upwind and at a distance, beyond the immediate areas of the central part of the metropolitan area.

Remainder of the State

All of the other ozone sites in Missouri were in attainment of the standard for the five most recent three-year periods.

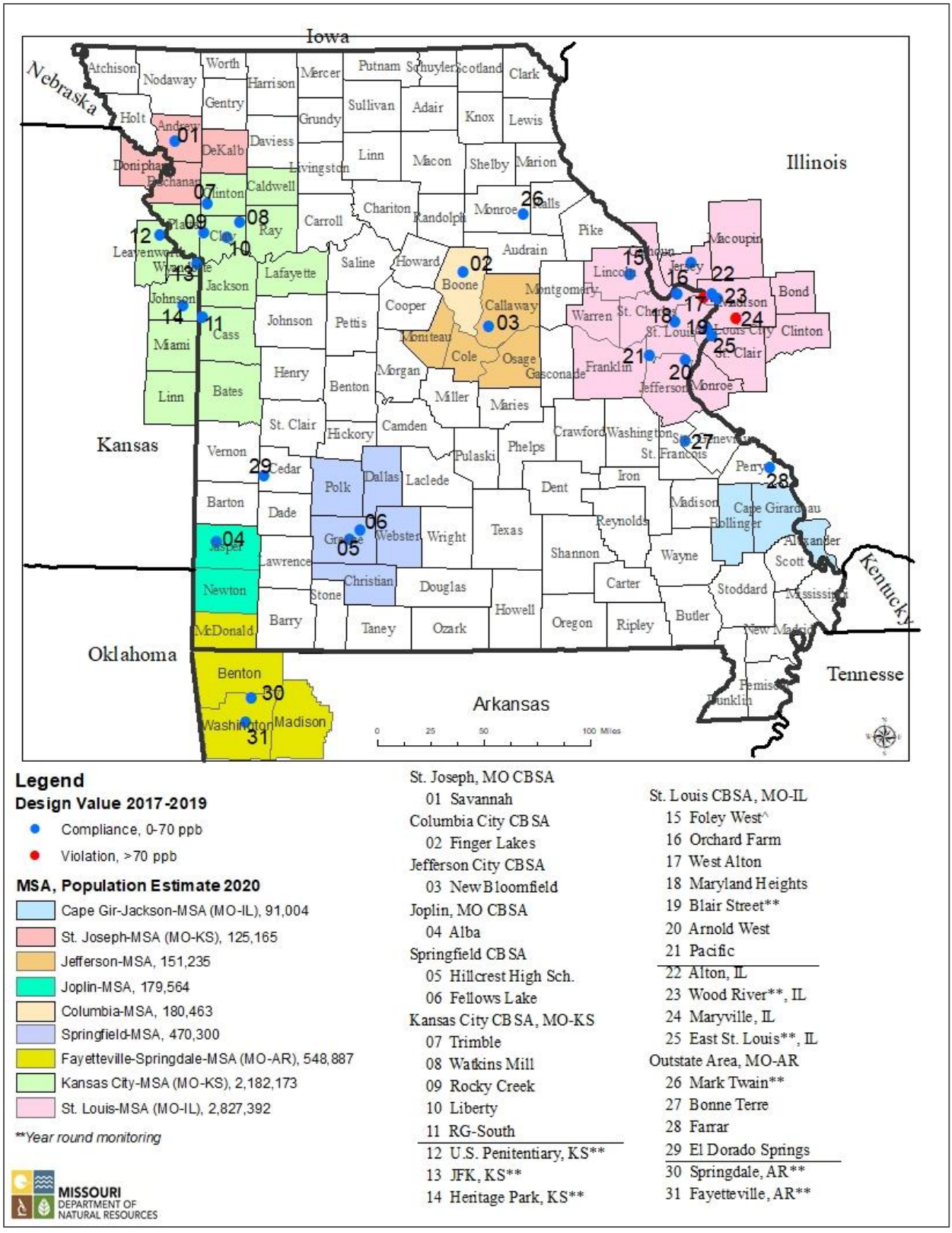


Figure 9-1. The 2020 Missouri Ozone Monitoring Network

Table 9-2

Ozone Design Values, ppb (3-Year Average of annual fourth-highest daily maximum 8-hour concentration)					
Yellow highlights indicate design values that exceed the standard.					
	13-15	**14-16**	**15-17**	**16-18**	**17-19**
Bonne Terre	65	66	65	65	63
El Dorado Springs	63	61	60	61	60
Farrar	66	67	67	67	64
Mark Twain State Park	59	59	59	60	59
Savannah	64	63	62	63	63
Finger Lakes	63	64	63	63	60
New Bloomfield	63	64	62	62	60
Alba	65	61	60	60	62
Branson	60	57	57	-	-
Hillcrest High School	61	59	60	61	61
Fellows Lake	61	60	60	61	61
Orchard Farm	69	71	70	72	69
West Alton	71	72	72	74	71
Blair Street	65	65	66	71	69
Maryland Heights	70	71	69	70	68
Pacific	65	65	64	66	65
Arnold West	70	70	68	69	67
Foley West	-	-	-	-	66
Foley	68	65	65	-	-
Liberty	64	64	65	69	68
Watkins Mill State Park	66	65	66	69	68
Rocky Creek	68	67	69	70	68
Richards Gebaur-South	64	63	63	63	64
Trimble	67	67	67	68	65

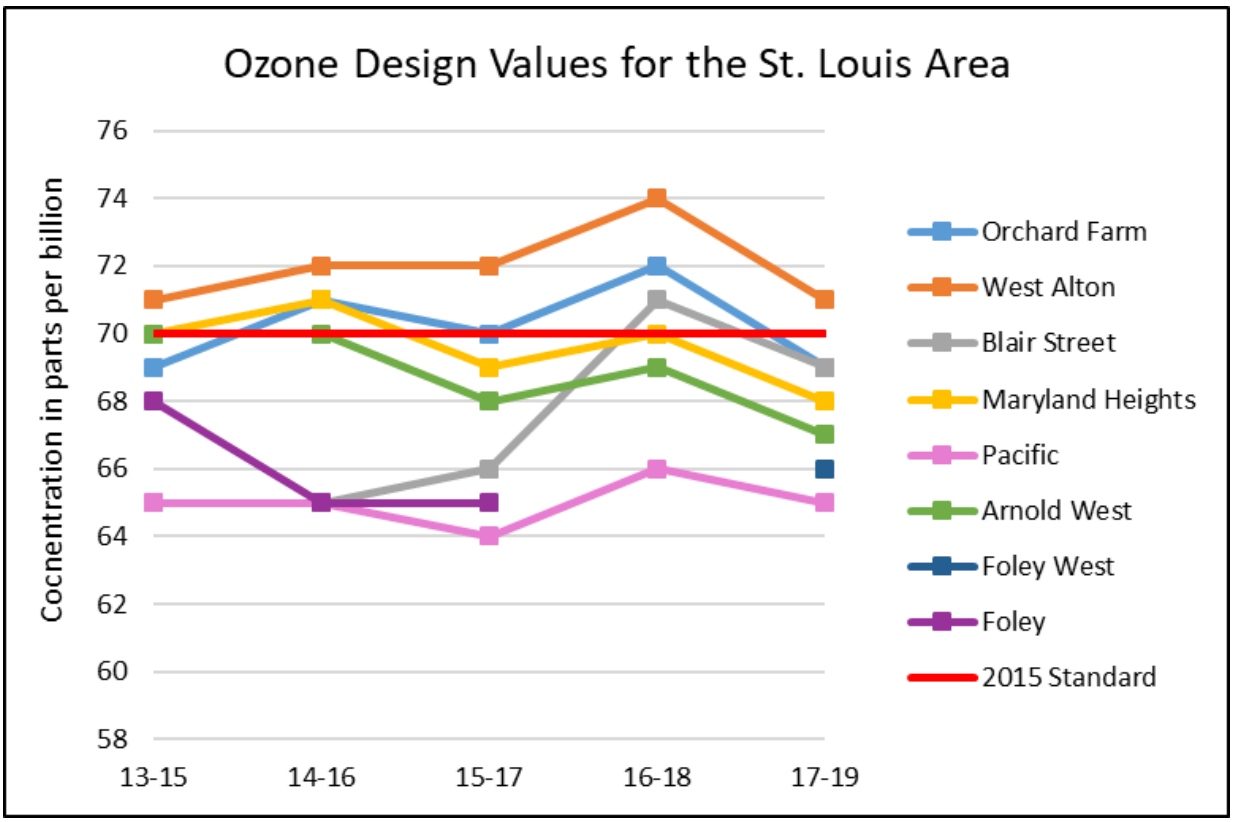


Figure 9-2. Ozone Design Values for the St. Louis Area

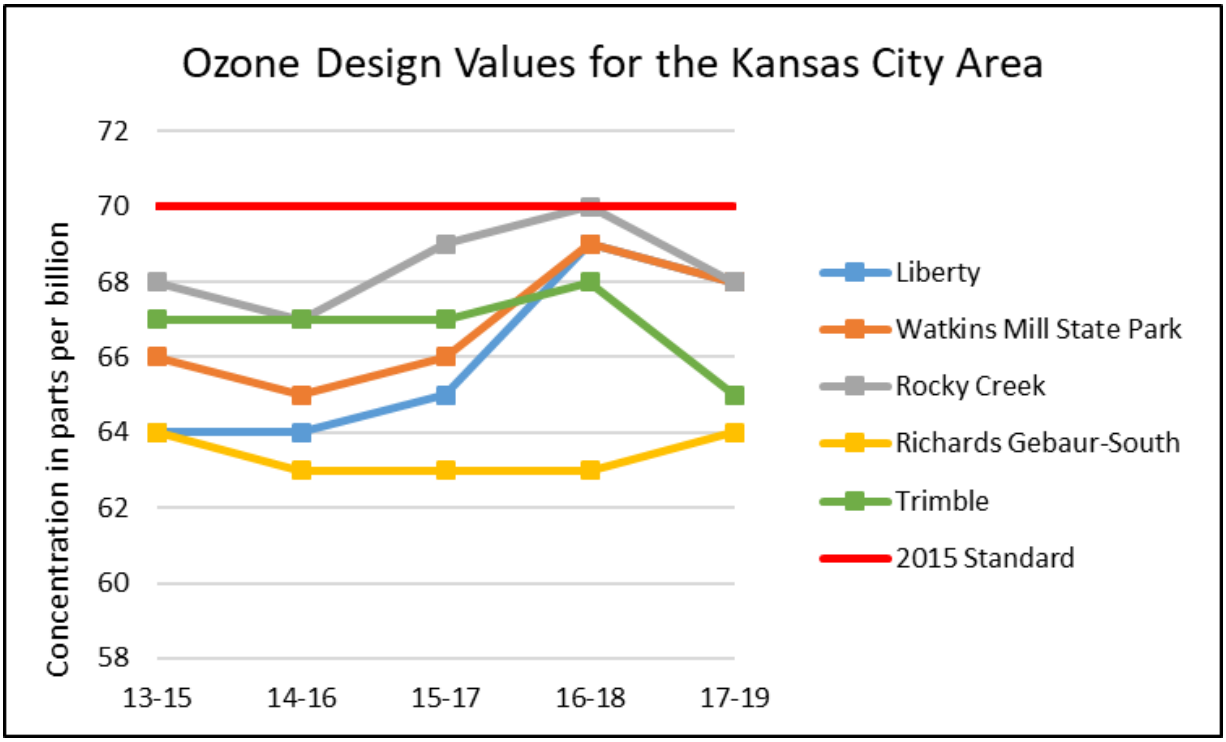


Figure 9-3. Ozone Design Values for the Kansas City Area

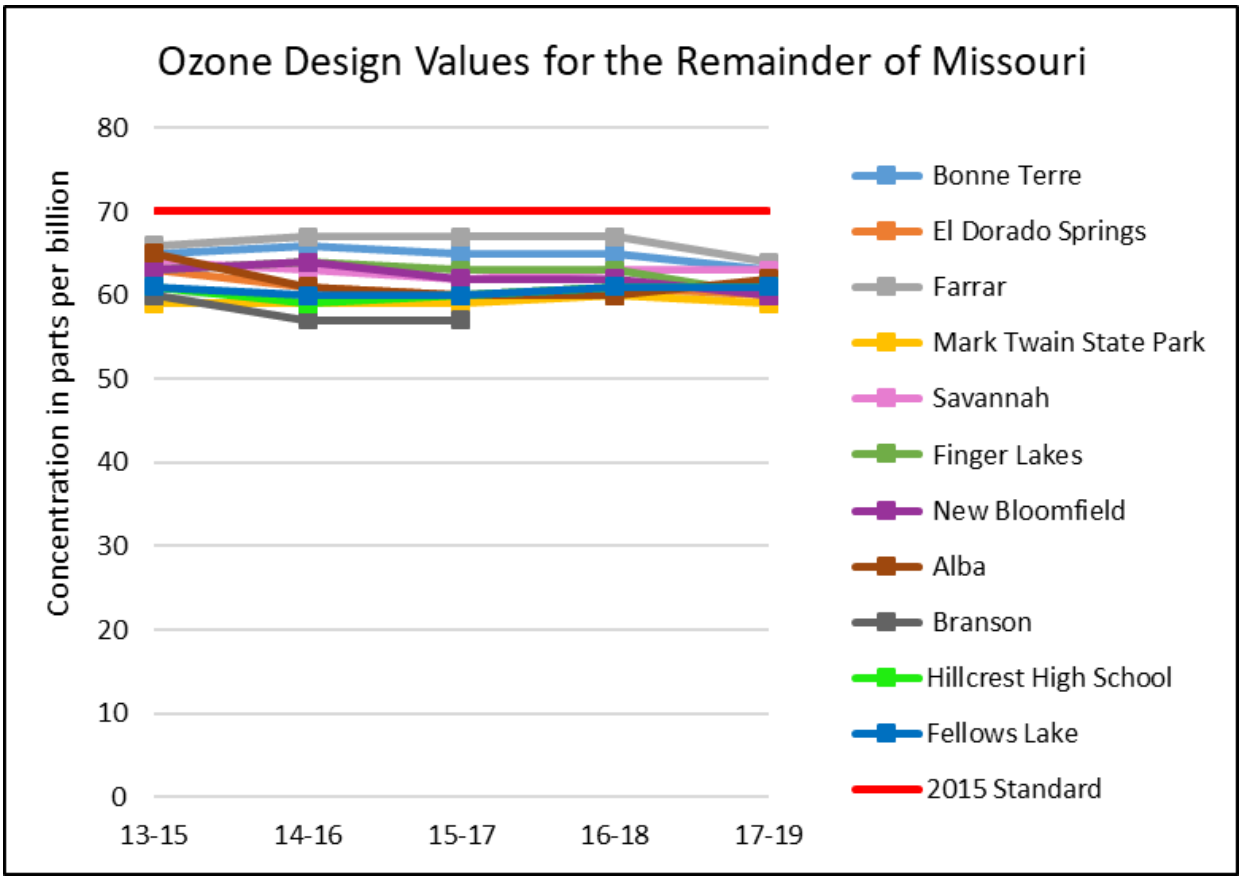


Figure 9-4. Ozone Design Values for the Remainder of Missouri

9.2.2 Application of Ambient Air Monitoring Network Assessment Tools

Tools for use in network assessments were originally developed and made available online by EPA at the time of preparation of 2010 network assessments, updated for the 2015 network assessments by the Lake Michigan Air Directors Consortium (LADCO), and updated by EPA for use in the 2020 network assessments. The 2020 version is available online. The tools are primarily applicable to assessment of O_3 and $PM_{2.5}$ networks. Results of the application of these tools to the Missouri O_3 network are presented in this section. The tools use data through 2018.

Area Served
The area served tool uses a spatial analysis technique to show the area represented by each monitoring site within a defined region. The shape and size of each polygon surrounding a site is determined by the proximity of the nearest neighboring sites. All points within a polygon are closer to the monitor in that polygon than to any other monitor. The tool only uses geometric analysis; there is no consideration of source locations, terrain or meteorology. Figure 9-5 shows the area served polygons surrounding each Missouri O_3 site. The polygons are smaller in the St. Louis and Kansas City areas, because there are relatively more sites in those areas.

Correlation Matrices
The correlation matrix tool generates a display that summarizes the correlation, relative difference and distance between pairs of monitoring sites. The numbers in the boxes below the diagonal in each matrix are the number of observations used in each correlation between two sites. The intensity of the shading represents the Pearson correlation for each pair of sites, with the darker shading indicating the weakest correlation. The numbers in the boxes above the diagonal are the distances in kilometers between the two sites. The intensity of the shading represents the mean absolute difference in ppm between each pair of site, with the darker shading indicating the greatest difference. The number in each diagonal box is the 2016 to 2018 design value for each site.

Figure 9-6 shows the correlation matrix for sites in the St. Louis area, including both Missouri and Illinois sites. The highest correlations and least differences in design values between sites, indicated by the lightest shading, are generally between sites that are close together. The sites to the north, generally downwind of central St. Louis, tend to be correlated with each other.

Figure 9-7 shows the correlation matrix for sites in the Kansas City area, including both Missouri and Kansas sites. As with the St. Louis area sites, the highest correlations and least differences in design values between sites, indicated by the lightest shading, are generally between sites that are close together. Sites to the south, generally upwind of central Kansas City tend to be correlated with each other, and sites to the north, generally downwind of central Kansas City tend to be correlated with each other.

Removal Bias
The removal bias tool uses the nearest neighbors to each site being evaluated to estimate the concentration at the location of the site if the site had never existed. This is done using an algorithm with inverse distance squared weighting. The squared distance allows for higher weighting on concentrations at sites located closer to the site being examined. The bias is

calculated for each day at each site by taking the difference between the predicted value from the interpolation and the measured concentration. A positive average bias means that if the site being examined was removed, the estimated concentration from the neighboring sites would be larger than the measured concentration. A negative average bias means that the estimated concentration from the neighboring sites is less than the measured concentration.

Figure 9-8 shows graphically the removal bias results for St. Louis area sites based on 2016 to 2018 data. As indicated by the blue color, the average concentration at West Alton, which is the design value site for the St. Louis area, would be underestimated if estimated from neighboring sites. The concentrations at Blair Street and Maryland Heights would also be underestimated if estimated from neighboring sites. As indicated by the red color, the concentration Arnold West would be overestimated if estimated from neighboring sites. The concentration at Orchard Farm would be slightly underestimated, and the concentration at Pacific would be slightly overestimated.

Figure 9-9 shows graphically the removal bias results for Kansas City area sites based on 2016 to 2018 data. As indicated by the blue color, the concentrations at Liberty, Rocky Creek, Richards Gebaur South or Trimble would be underestimated using neighboring sites. As indicated by the red color, the concentration at Watkins Mill and the JFK site in Kansas would be overestimated from neighboring sites.

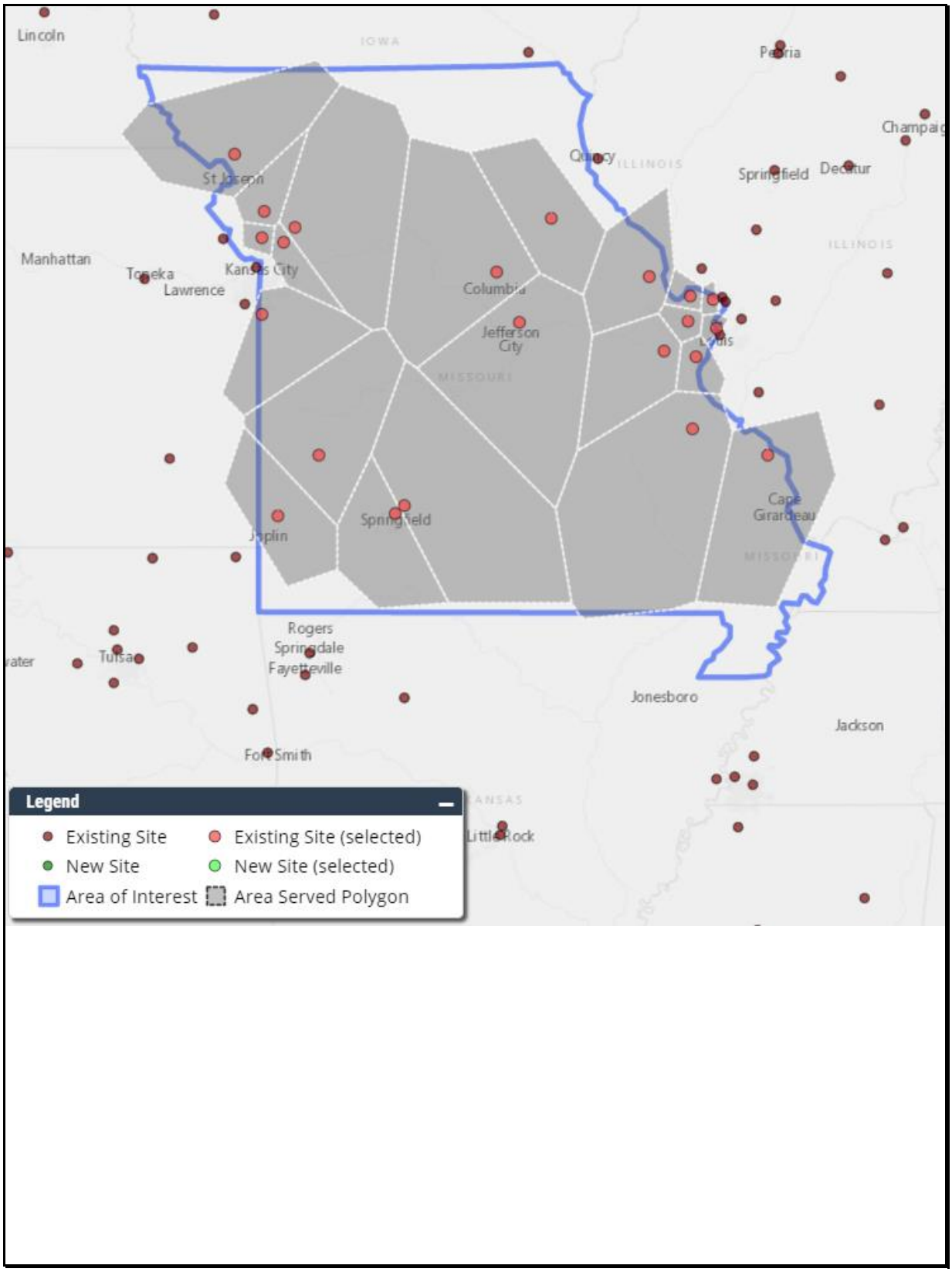
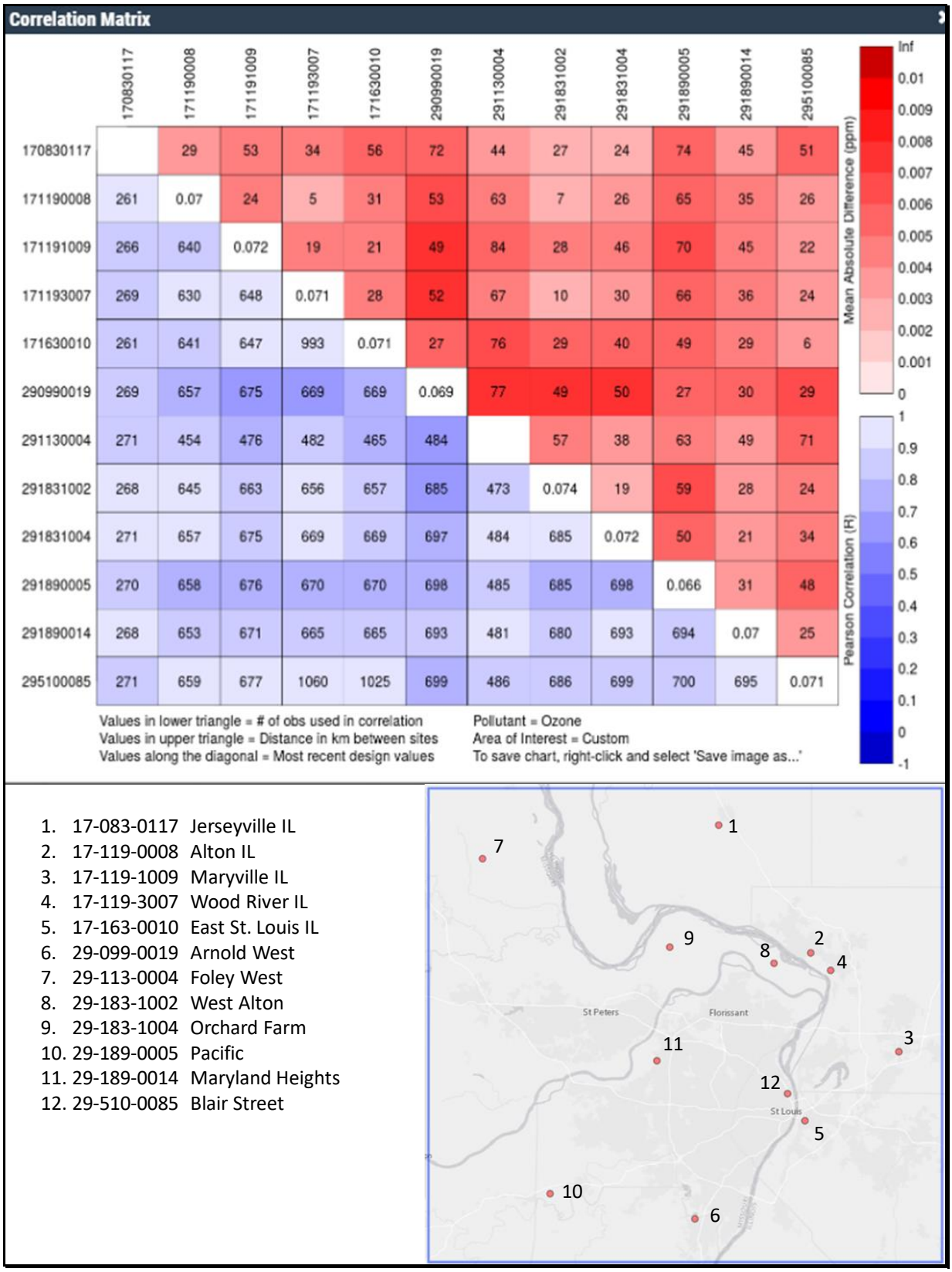
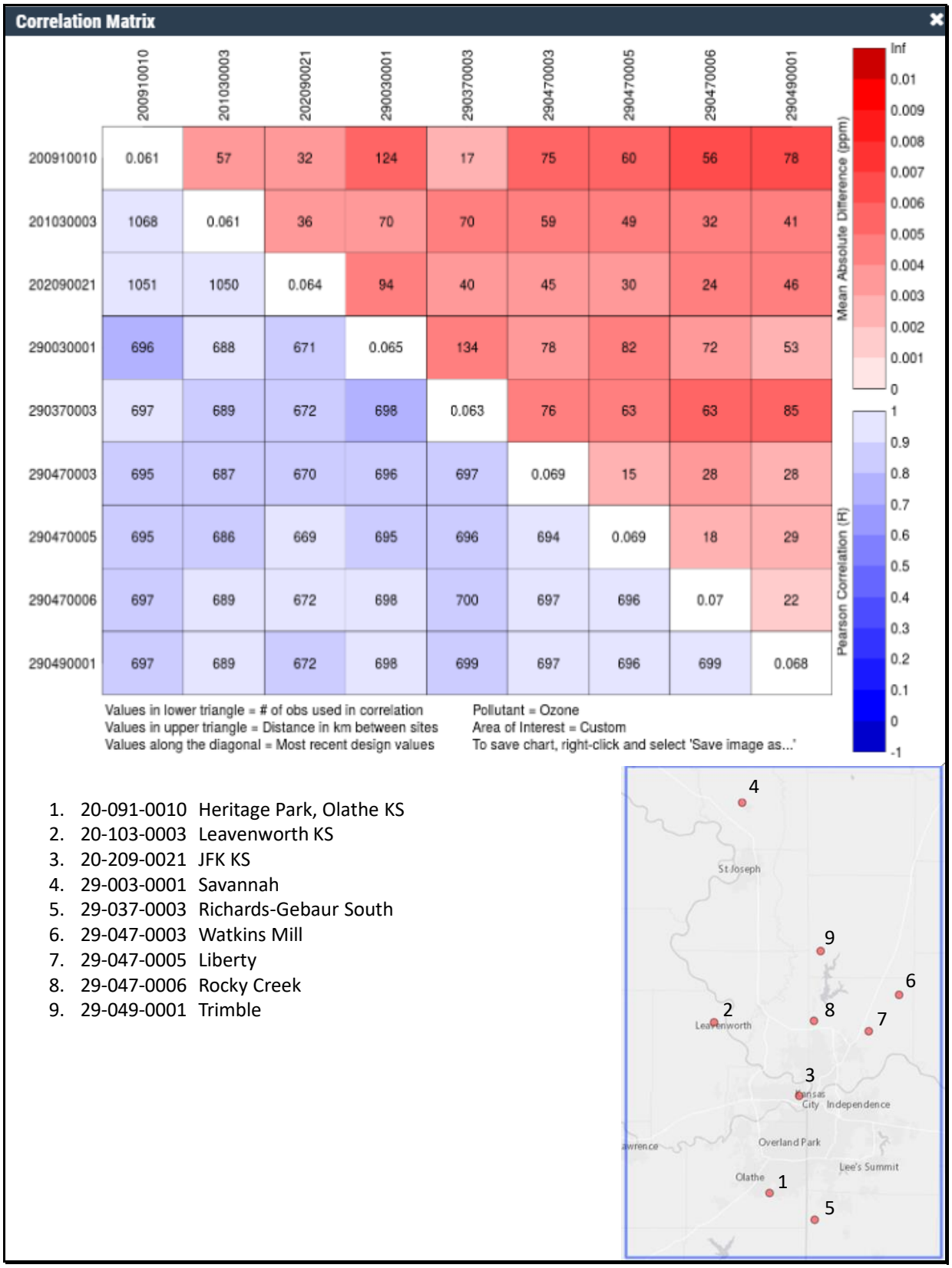


Figure 9-5. Area Served Polygons for Missouri O_3 Sites



1. 17-083-0117 Jerseyville IL
2. 17-119-0008 Alton IL
3. 17-119-1009 Maryville IL
4. 17-119-3007 Wood River IL
5. 17-163-0010 East St. Louis IL
6. 29-099-0019 Arnold West
7. 29-113-0004 Foley West
8. 29-183-1002 West Alton
9. 29-183-1004 Orchard Farm
10. 29-189-0005 Pacific
11. 29-189-0014 Maryland Heights
12. 29-510-0085 Blair Street

Figure 9-6. Correlation Matrix for St. Louis Area O_3 Sites



1. 20-091-0010 Heritage Park, Olathe KS
2. 20-103-0003 Leavenworth KS
3. 20-209-0021 JFK KS
4. 29-003-0001 Savannah
5. 29-037-0003 Richards-Gebaur South
6. 29-047-0003 Watkins Mill
7. 29-047-0005 Liberty
8. 29-047-0006 Rocky Creek
9. 29-049-0001 Trimble

Figure 9-7. Correlation Matrix for Kansas City Area O_3 Sites

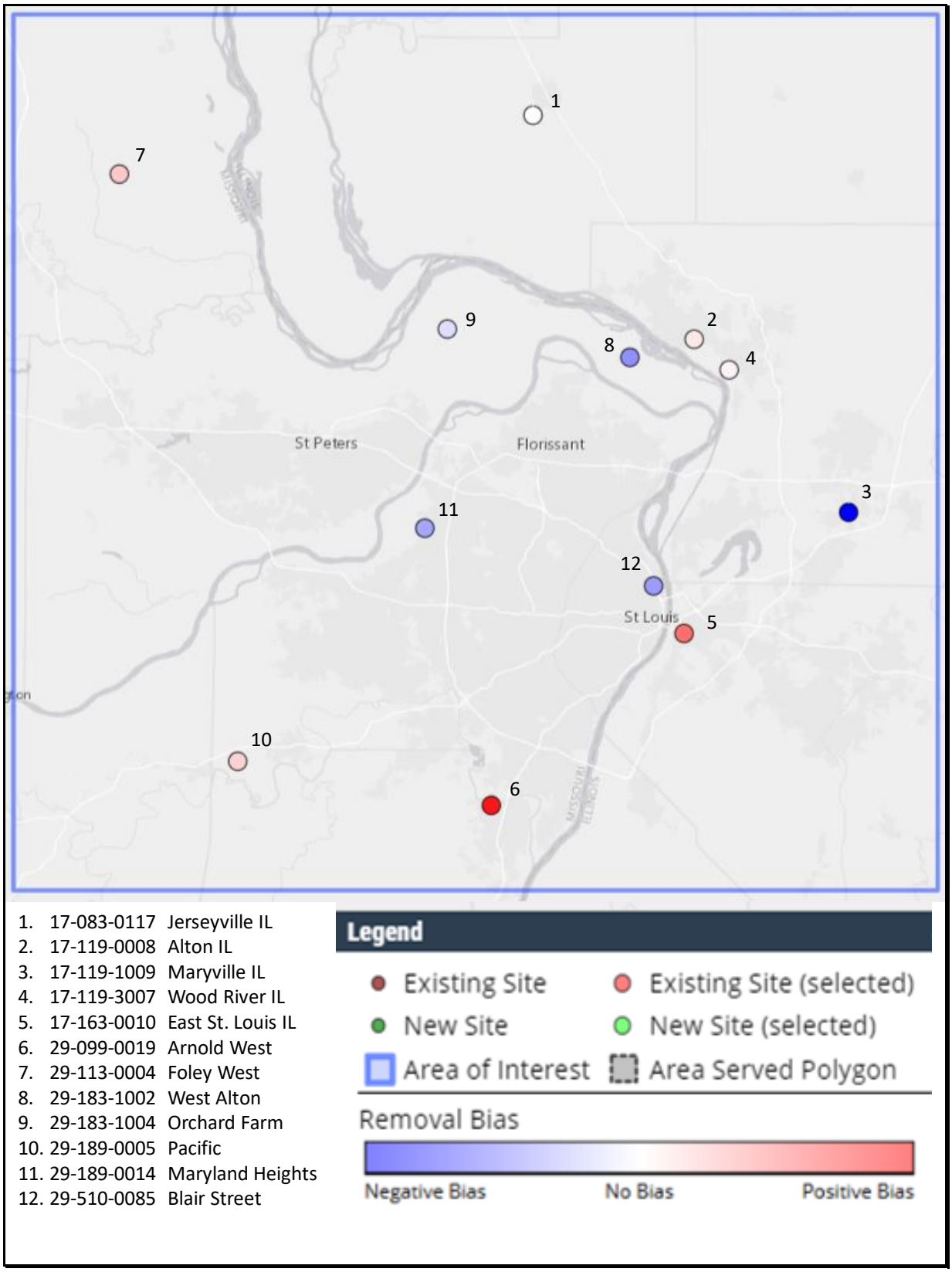


Figure 9-8. Removal Bias for St. Louis Area O_3 Sites

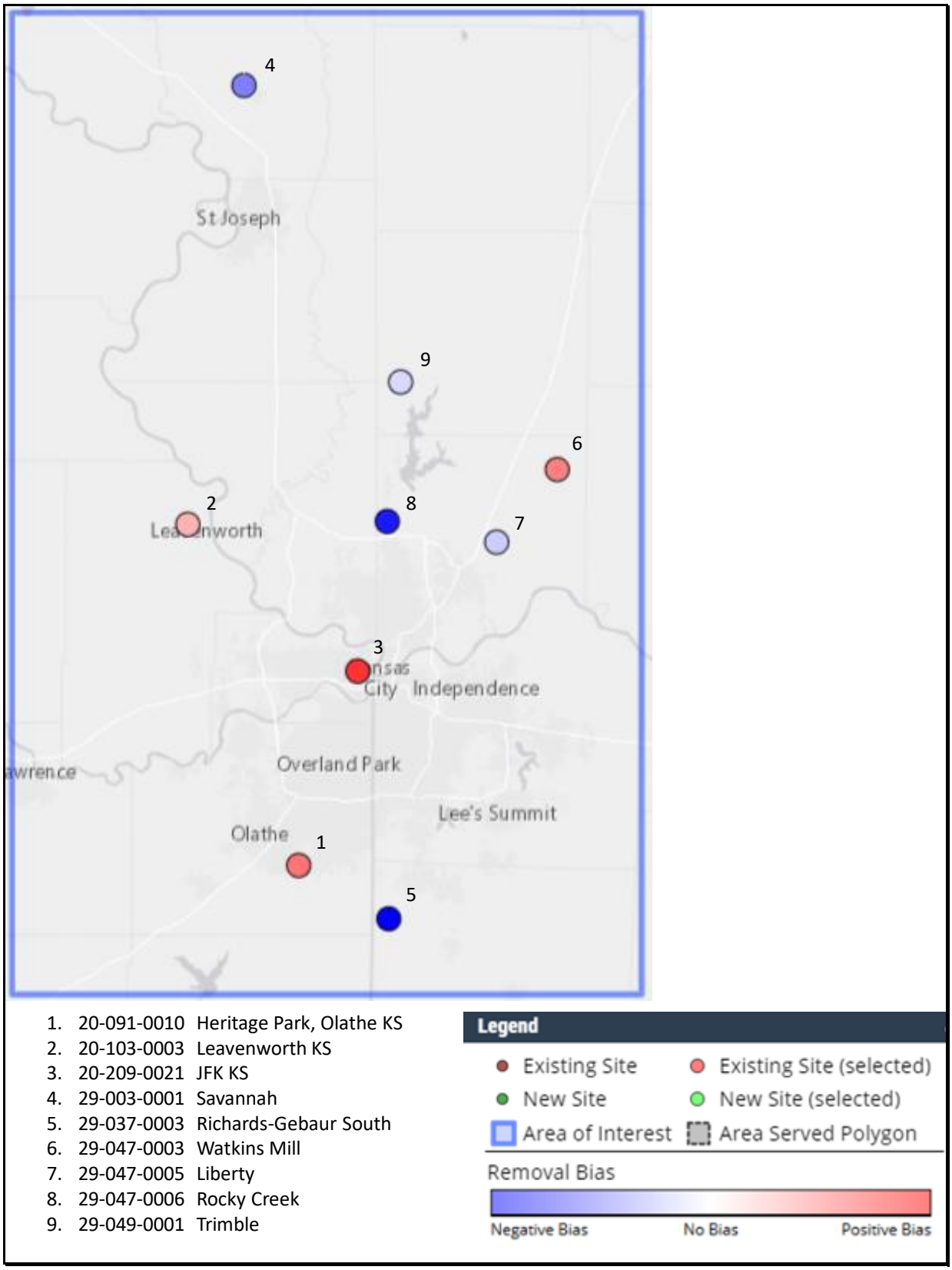


Figure 9-9. Removal Bias for Kansas City Area O_3 Sites

9.3 Ozone Precursor Emissions

NO_X and VOCs are known precursors of O_3. Point, mobile and area NO_X emissions are discussed in Section 7.3. VOC emissions are discussed below.

9.3.1 Point Source Emissions

NO_X point source emissions and ozone monitoring sites are shown in Figure 9-10. VOC point sources emissions and ozone monitoring sites are shown in Figure 9-11. A great number of VOC sources are located in the central areas of the St. Louis and Kansas City metropolitan areas and along the Missouri and Mississippi rivers. Like NO_X sources, quite a few point sources are also located in the Joplin area. Total VOC point source emissions in 2018 were 16,000 tons. Point source VOC emissions have been fairly constant over the last five years (2014 to 2018).

9.3.2 Mobile Source Emissions

Figures 5-4 and 5-5 show traffic counts in the St. Louis and Kansas City areas. This information is used as a surrogate for mobile source emissions of both NO_X and VOCs. As shown in the figures, the central areas of the metropolitan areas contain some of the most traveled segments of traffic arteries and major interstate highways. It would, therefore, be expected that these areas have high levels of mobile emissions.

9.3.3 VOC Area Source Emissions

Figure 9-12 shows 2016 VOC area source emissions. Highest emissions are estimated for the St. Louis and Kansas City areas. The high VOC emissions in these areas coincide with high NO_X area emissions (see Figure 7-6). Moderate emissions are estimated for Greene and New Madrid counties. Area sources generally correlate with population density (see Section 2.0). Estimated area source emissions of VOC totaled about 106,000 tons per year.

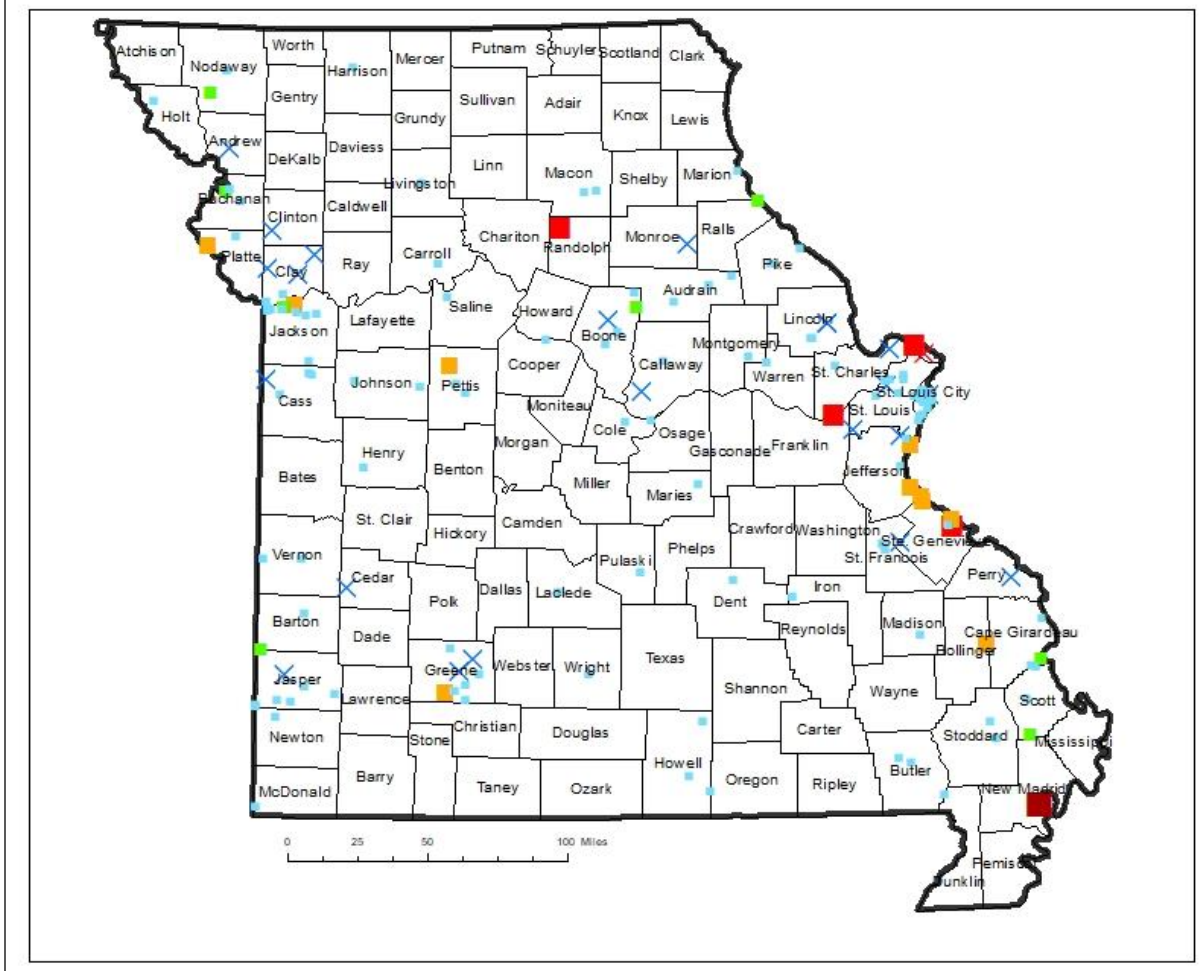


Figure 9-10. 2018 Missouri Statewide Area Source NOx Point Source Emissions and the 2020 Ozone Monitoring Network

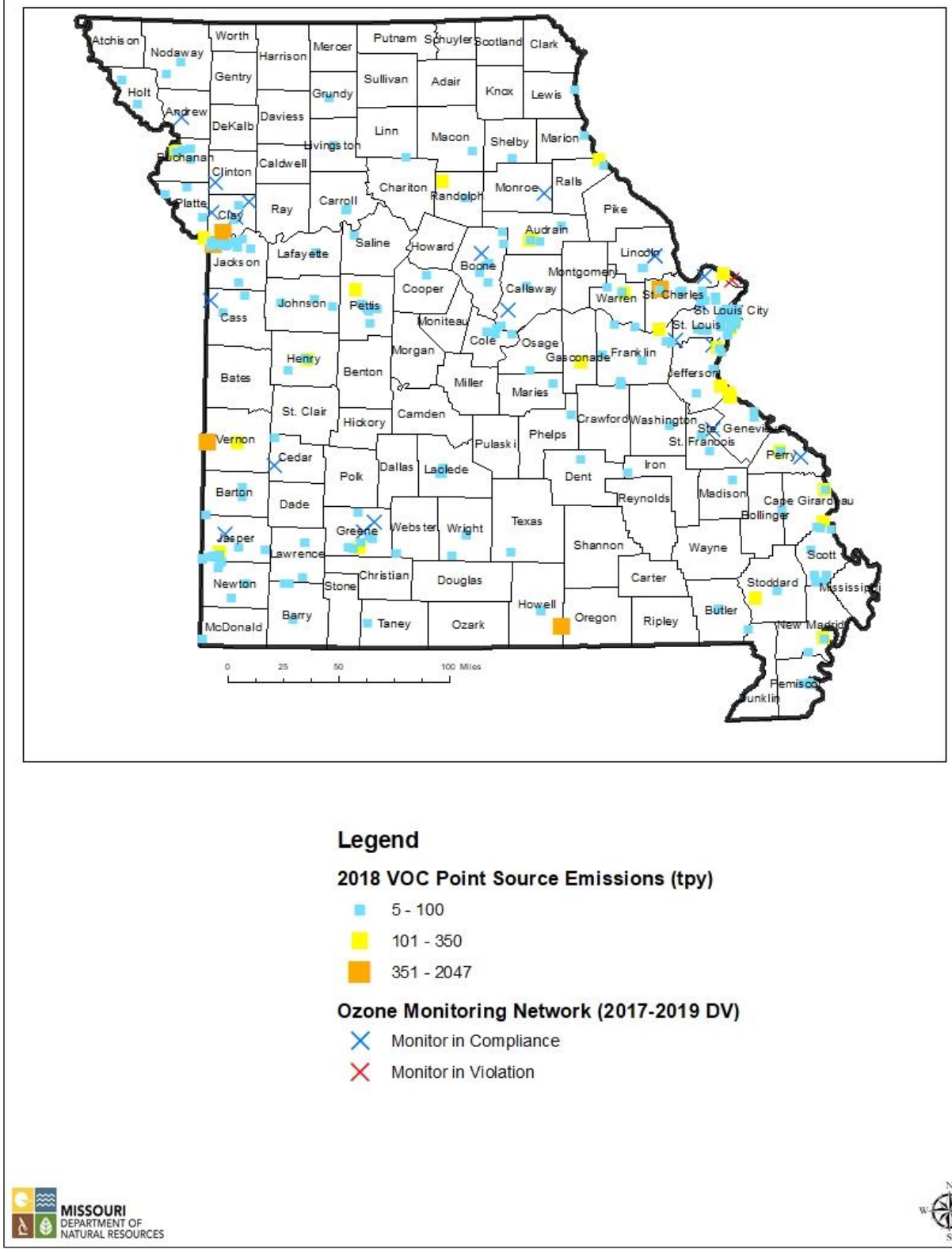


Figure 9-11. 2018 Statewide VOC Point Source Emissions and the 2020 Ozone Monitoring Network

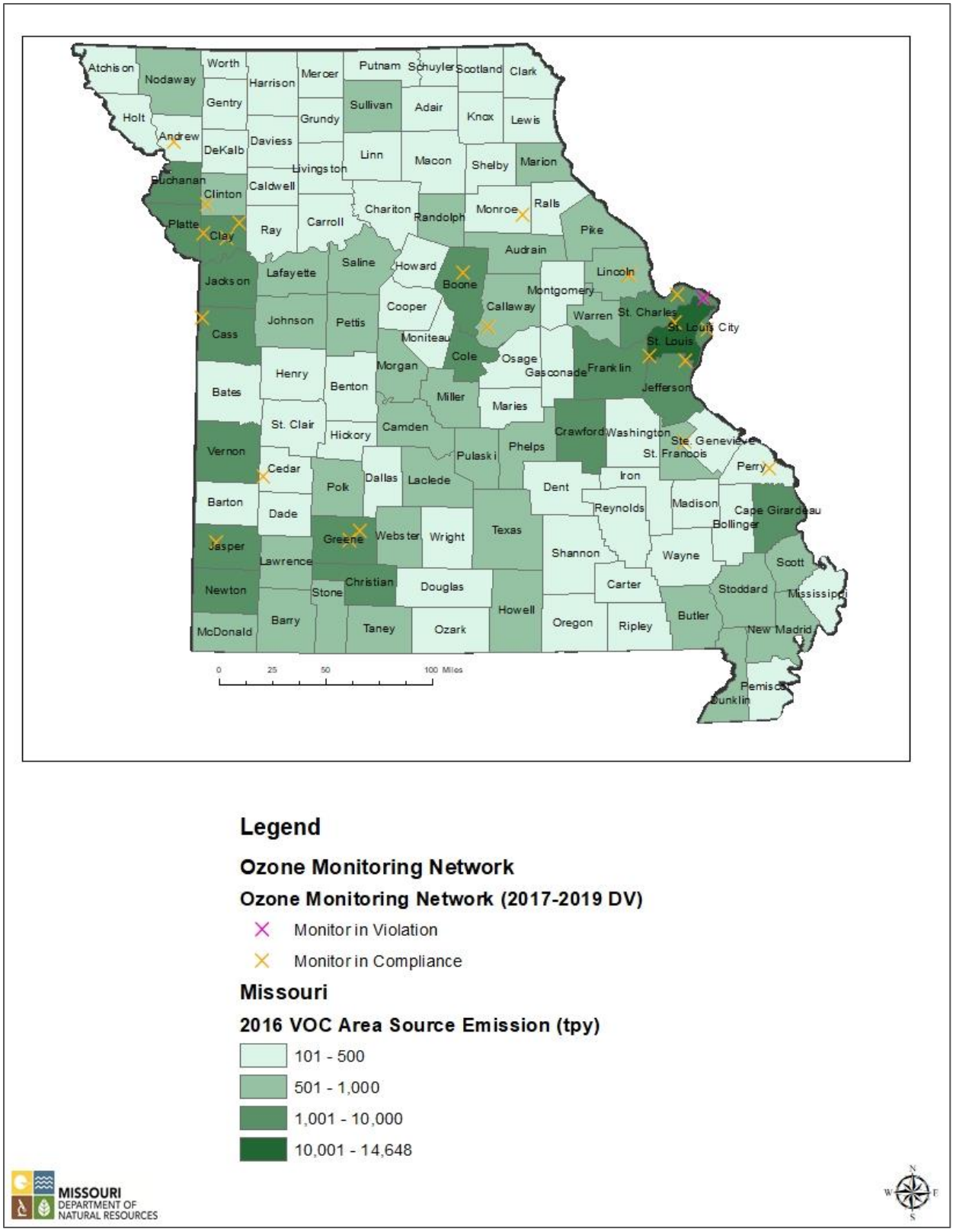


Figure 9-12. 2016 Missouri Statewide Area Source VOC Emissions and the 2020 Ozone Monitoring Network

9.4. Evaluation of O_3 Monitoring Sites

St. Louis Area

West Alton is the design value site for the area and is therefore critical. Because the West Alton site is critical, elevation of the site above the level of past (and potential future) flooding is being evaluated, as discussed above. Because they help to meet the recommendation that more than one site may be needed to measure the maximum O_3 concentration in the St. Louis area, Orchard Farm and Maryland Heights are also critical.

Blair Street, Pacific, Arnold West and Foley are in compliance for the most recent three-year period. Blair Street is critical because it is an NCore site. Pacific and Arnold West are located southerly and generally upwind of the St. Louis urban core, and are therefore critical in determining regional background for the St. Louis area. Foley West is located downwind, but at a greater distance from the core of the metropolitan area and is therefore critical in helping to define the extent of nonattainment of the standard. All of these sites are therefore critical despite some correlation between some sites as discussed above.

From Table 9-1, the required number of sites in the St. Louis area is two, so that the existing network more than meets this requirement.

Kansas City Area

As discussed above and shown in Table 9-2 and Figure 9-3, all of the sites in the Kansas City area were within the standard for the most recent three-year period (2017 to 2019). However, Trimble, Watkins Mill, Liberty and Rocky Creek, in the Kansas City area have violated the standard in the past, and all four of these sites, located north and generally downwind of central Kansas City, have measured similar concentrations. Therefore, all four of these sites are critical in measuring the maximum O_3 concentrations in the Kansas City area and defining the extent of potential exceedance of the standard if the standard is made more stringent.

The Richards-Gebaur South site, located generally upwind of the central Kansas City area, is critical in determining regional background for the Kansas City area.

From Table 9-1, the required number of sites in the Kansas City area is two, so that the existing network more than meets this requirement.

Remainder of the State

Alba, New Bloomfield, Finger Lakes and Savannah are critical sites, because they are located in MSAs of 50,000 to 350,000 people, (i.e., Joplin, Jefferson City, Columbia and St. Joseph, respectively), and have measured concentrations greater than 85% of the standard.

Hillcrest High School and Fellows Lake are located about 10 to 15 miles downwind of the Springfield urban core. From Table 9-1, the required number of sites in the Springfield area is two, so that both of these sites are critical.

Bonne Terre, Mark Twain State Park and El Dorado Springs are regional background sites for east, north-central and west Missouri respectively. These sites are critical in determining regional background

Farrar has measured concentrations greater than 85% of the standard and is located generally downwind of in-state and out-of-state sources of NO_X and VOC that may impact the site. Therefore, the Farrar site is critical.

10.0 $PM_{2.5}$ Network Assessment

10.1 Introduction: $PM_{2.5}$ Standards and Monitoring Requirements

The level of the $PM_{2.5}$ annual primary standard is 12 µg/m^3. The level of the annual secondary standard is 15 µg/m^3. The form of both annual standards is the annual mean averaged over three years. The level of the 24-hour primary and secondary standards is 35 µg/m^3. The form of the 24-hour standards is the three-year average of the annual 98th percentile of 24-hour averages The NAAQS are listed in the EPA NAAQS Table on the internet. The $PM_{2.5}$ NAAQS were reviewed and proposed to not be changed in 2020.

Table 10-1 from 40 CFR, Part 58, Appendix D lists minimum $PM_{2.5}$ monitoring requirements. Eighty-five percent of the annual primary standard is 10.2 µg/m^3, and 85% of the 24-hour standard is 29.75 µg/m^3.

Table 10-1. Minimum Numbers of $PM_{2.5}$ Samplers Required

MSA population[1] [2]	Most Recent 3-Year DV≥85% of any $PM_{2.5}$ NAAQS[3]	Most Recent 3-Year DV<85% of any $PM_{2.5}$ NAAQS[3] [4]
>1,000,000	3	2
500,000-1,000,000	2	1
50,000-<500,000[5]	1	0

[1]Minimum monitoring requirements apply to the Metropolitan statistical area (MSA).
[2]Population based on latest available census figures.
[3]The $PM_{2.5}$ National Ambient Air Quality Standards (NAAQS) levels and forms are defined in 40 CFR Part 50.
[4]These minimum monitoring requirements apply in the absence of a design value.
[5]Metropolitan statistical areas (MSA) must contain an urbanized area of 50,000 or more population.

Based on population information in Section 2.0, the first line of the table applies to the St. Louis and Kansas City MSAs, and the third line applies to the Springfield, Joplin, Columbia, Jefferson City, St. Joseph and Cape Girardeau MSAs. The Fayetteville-Springdale-Rogers area includes only one county in Missouri and no urban areas larger than 50,000 in Missouri.

In addition to the minimum numbers of sites in each MSA, each state must monitor at one regional background site and one regional transport site. Continuous $PM_{2.5}$ monitors must be operated at a minimum of half of the required sites. At least one of the required FRM/FEM monitor in each MSA must be collocated, and at least 15% of the overall network must have collocated monitors. Near-roadway $PM_{2.5}$ monitoring is also required at one location in each urban area (a core-based statistical area, or CBSA) with a population of 1 million or more.

10.2 $PM_{2.5}$ Monitoring Results in Missouri

There are currently 15 sites that monitor $PM_{2.5}$ in Missouri (Figure 10-1), including 13 sites for NAAQS compliance determination and two IMPROVE samplers (at Hercules Glades and Mingo). Six of the NAAQS compliance sites are in the St. Louis area, and four are in the Kansas City area. One site is in the Springfield area and one in the St. Joseph area. One site is in a rural area. There are also two $PM_{2.5}$ speciation samplers at Blair Street and Arnold West.

10.2.1 $PM_{2.5}$ Design Values

$PM_{2.5}$ design values for the past five years in Missouri as determined according to the annual NAAQS are listed in Table 10-2 and shown in Figure 10-2. $PM_{2.5}$ design values determined according to the 24-hour NAAQS are listed in Table 10-3 and shown in Figure 10-3. All Missouri monitors have met the annual standard during this period, even though Branch Street is designated as a middle scale site, not to be compared to the annual NAAQS. All Missouri monitors have also met the 24-hour standard for all of the periods under consideration.

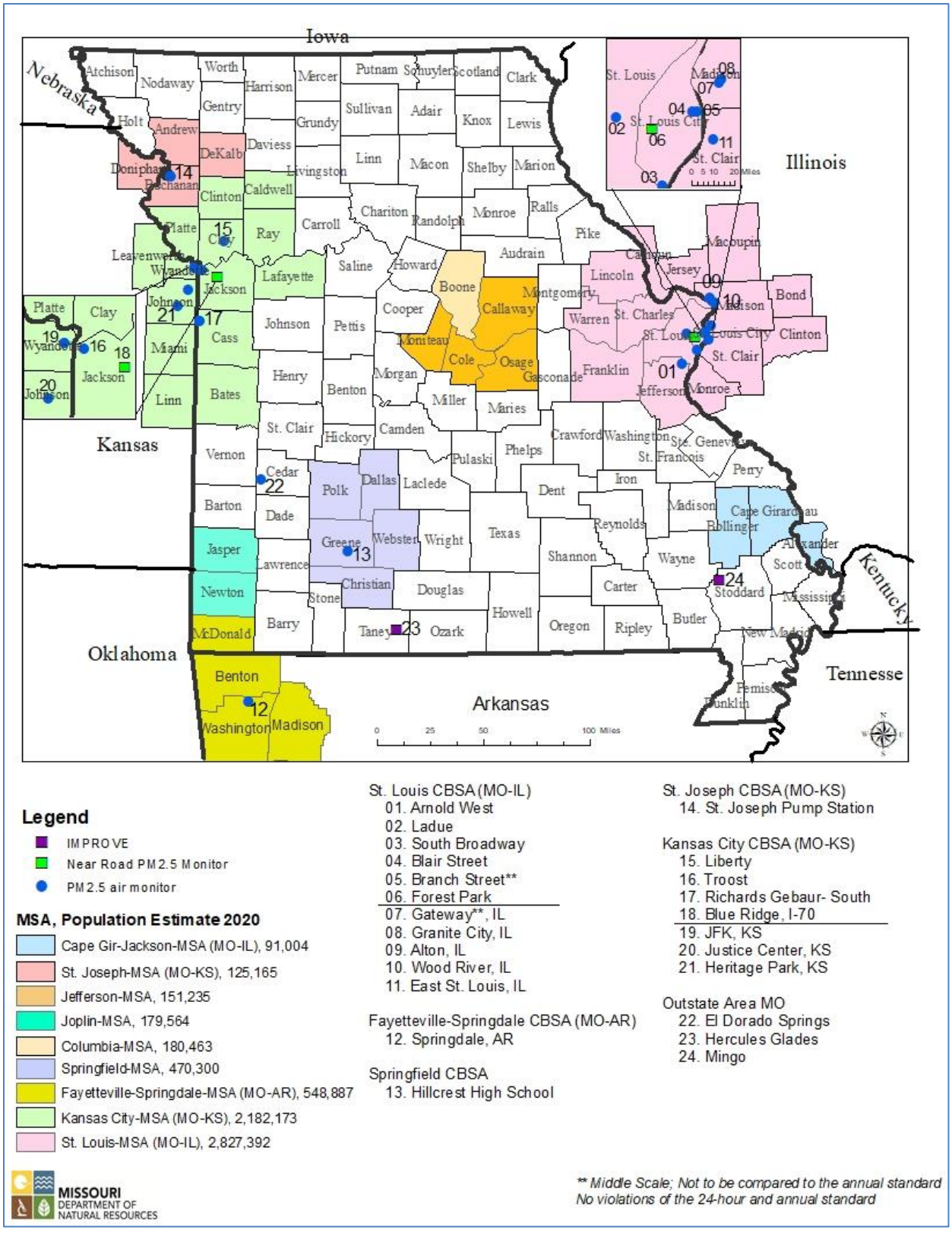


Figure 10-1. 2020 Missouri $PM_{2.5}$ Monitoring Network

Table 10-2

PM2.5 24-hour Design Value in µg/m^3 (3-year average of the annual 98th percentile 24-hour average)					
	13-15	**14-16**	**15-17**	**16-18**	**17-19**
Arnold West	24	23	20	18	17
Ladue	24	22	21	20	20
South Broadway	24	24	21	19	19
Blair Street	25	24	20	19	20
Branch Street	25	24	21	20	20
Forest Park, I-64	-	23	19	20	20
Liberty	20	18	16	15	15
Troost	20	20	20	20	19
Richards Gebaur- South	21	20	17	15	16
Blue Ridge, I-70	-	16	16	16	17
Hillcrest High School	-	-	16	16	16
El Dorado Springs	19	18	16	17	18
St. Joseph Pump Station	22	20	19	18	18

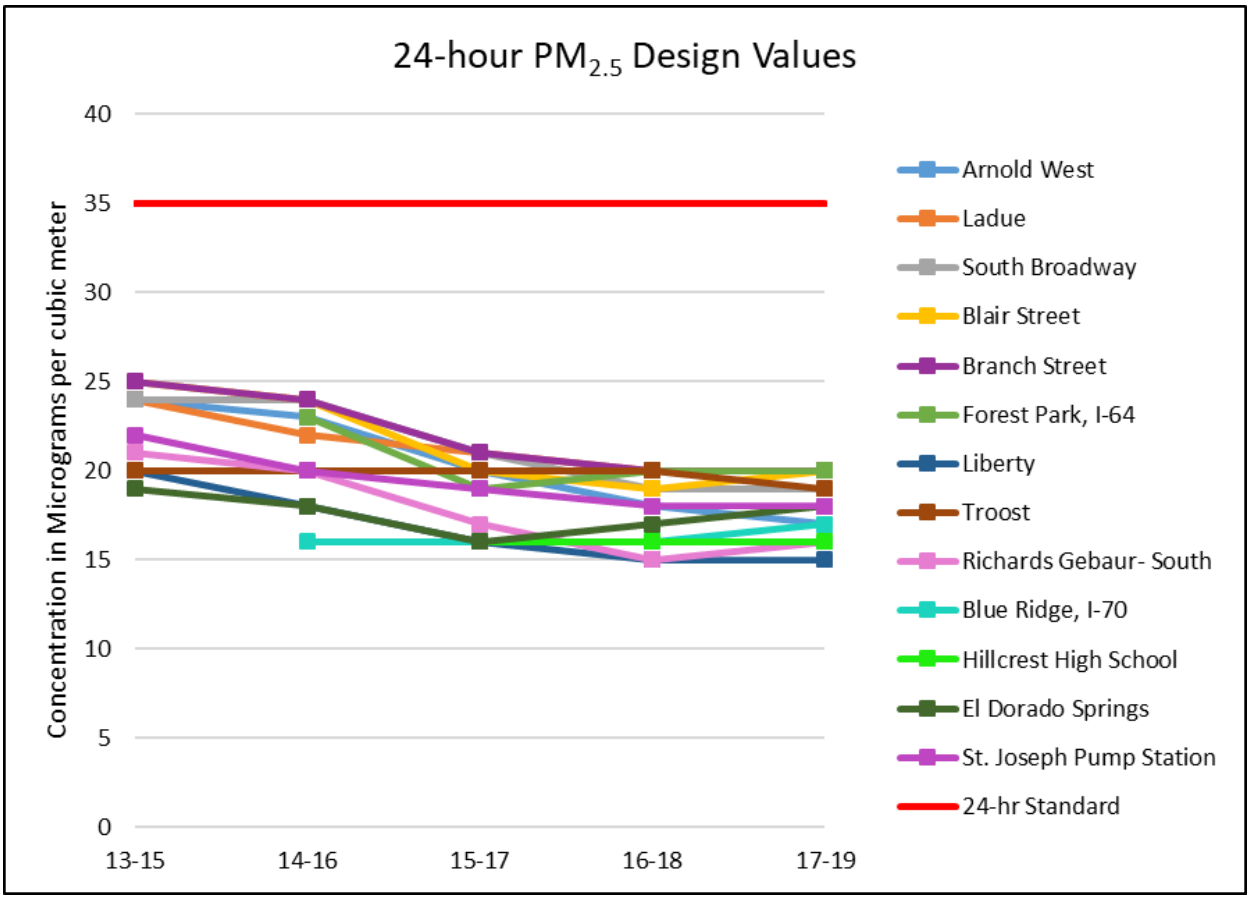


Figure 10-2. 24-hour $PM_{2.5}$ Design Values

Table 10-3

PM2.5 Annual Design Value in µg/m^3 (3-year average of the annual average)					
	13-15	**14-16**	**15-17**	**16-18**	**17-19**
Arnold West	10.6	10.1	9.3	8.0	7.3
Ladue	10.7	9.9	9.5	9.1	9.2
South Broadway	10.6	9.8	9.0	8.4	8.6
Blair Street	11.0	10.1	8.9	8.4	8.7
Forest Park, I-64	-	9.6	8.7	8.5	8.7
Liberty	8.6	7.8	7.1	6.4	6.4
Troost	9.1	8.8	9.0	8.8	8.2
Richards Gebaur- South	9.4	8.5	7.3	6.5	6.6
Blue Ridge, I-70	-	7.1	7.1	7.4	8
Hillcrest High School	-	-	7.3	7.4	7.4
El Dorado Springs	7.9	7.3	6.8	6.9	7.3
St. Joseph Pump Station	10.5	9.5	8.8	8.5	8.7

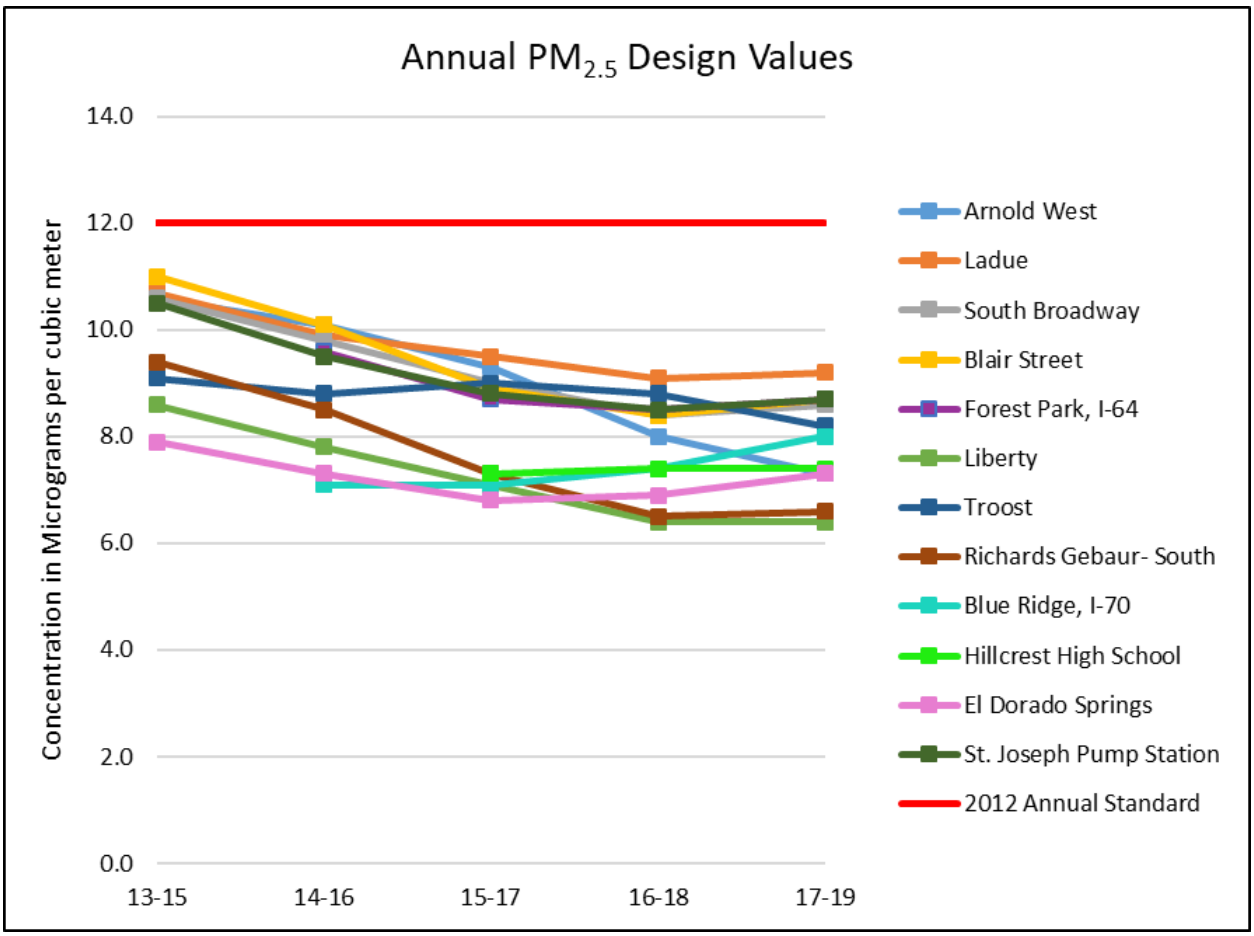


Figure 10-3. Annual $PM_{2.5}$ Design Values

10.2.2 Application of Ambient Air Monitoring Assessment Tools

The ambient air monitoring assessment tools described in Section 9.2.2 were applied to the $PM_{2.5}$ network using data through 2018.

Correlation Matrices

The correlation matrix tool generates a display that summarizes the correlation, relative difference and distance between pairs of monitoring sites. The numbers in the boxes below the diagonal in each matrix are the number of observations used in each correlation between two sites. The intensity of the shading represents the Pearson correlation for each pair of sites, with the darker shading indicating the weakest correlation. The numbers in the boxes above the diagonal are the distances in kilometers between the two sites. The intensity of the shading represents the mean absolute difference in ppm between each pair of site, with the darker shading indicating the greatest difference. The number in each diagonal box is the 2016 to 2018 design value for each site.

Figure 10-4 shows the correlation matrix for sites in the St. Louis area. The slightly darker shading indicates that the Arnold West site is somewhat less well correlated with the sites in the central St. Louis urban area than those sites are with each other.

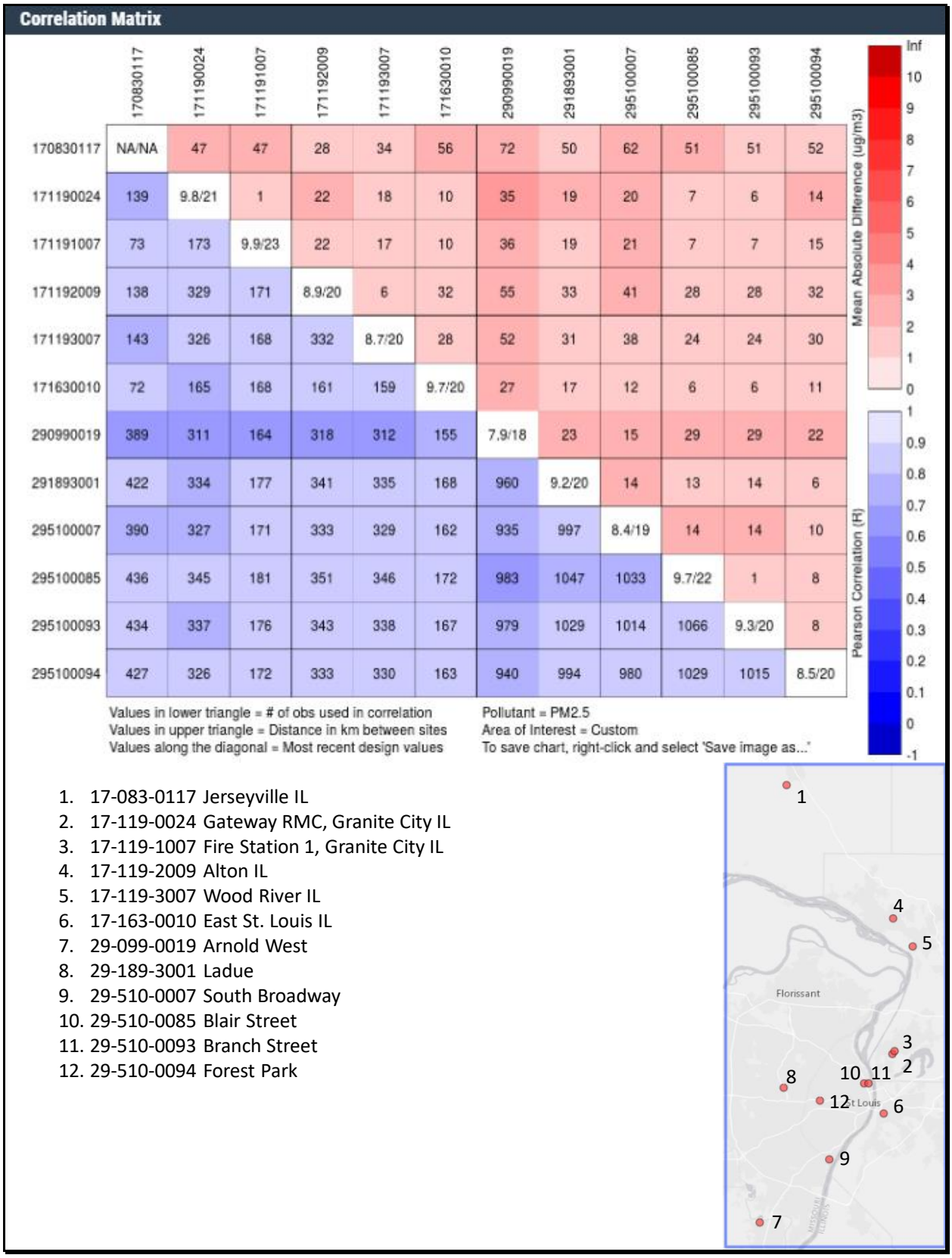
Figure 10-5 shows the correlation matrix for sites in the Kansas City area. The Troost site is slightly less well correlated with the other sites than they are with each other, possibly because of its location in the urban core.

Removal Bias

As described in Section 9.2.2, blue indicates negative removal bias (the concentration would be underestimated if the site were removed), red indicates positive removal bias (the concentration would be overestimated if the site were removed), and the intensity of the color indicates the magnitude of the removal bias.

Figure 10-6 shows the removal bias for sites in the St. Louis area. Among Missouri sites, the bias is highest (negative) at Ladue and (positive) at Forest Park, Arnold West and South Broadway. Blair Street and Branch Street both have a low removal bias.

Figure 10-7 shows the removal bias for Kansas City area sites. Of the Missouri sites, Troost show a high negative bias, and Liberty shows a high positive bias. Blue Ridge I-70 shows a lower positive bias.



1. 17-083-0117 Jerseyville IL
2. 17-119-0024 Gateway RMC, Granite City IL
3. 17-119-1007 Fire Station 1, Granite City IL
4. 17-119-2009 Alton IL
5. 17-119-3007 Wood River IL
6. 17-163-0010 East St. Louis IL
7. 29-099-0019 Arnold West
8. 29-189-3001 Ladue
9. 29-510-0007 South Broadway
10. 29-510-0085 Blair Street
11. 29-510-0093 Branch Street
12. 29-510-0094 Forest Park

Figure 10-4. Correlation Matrix for St. Louis Area $PM_{2.5}$ Sites

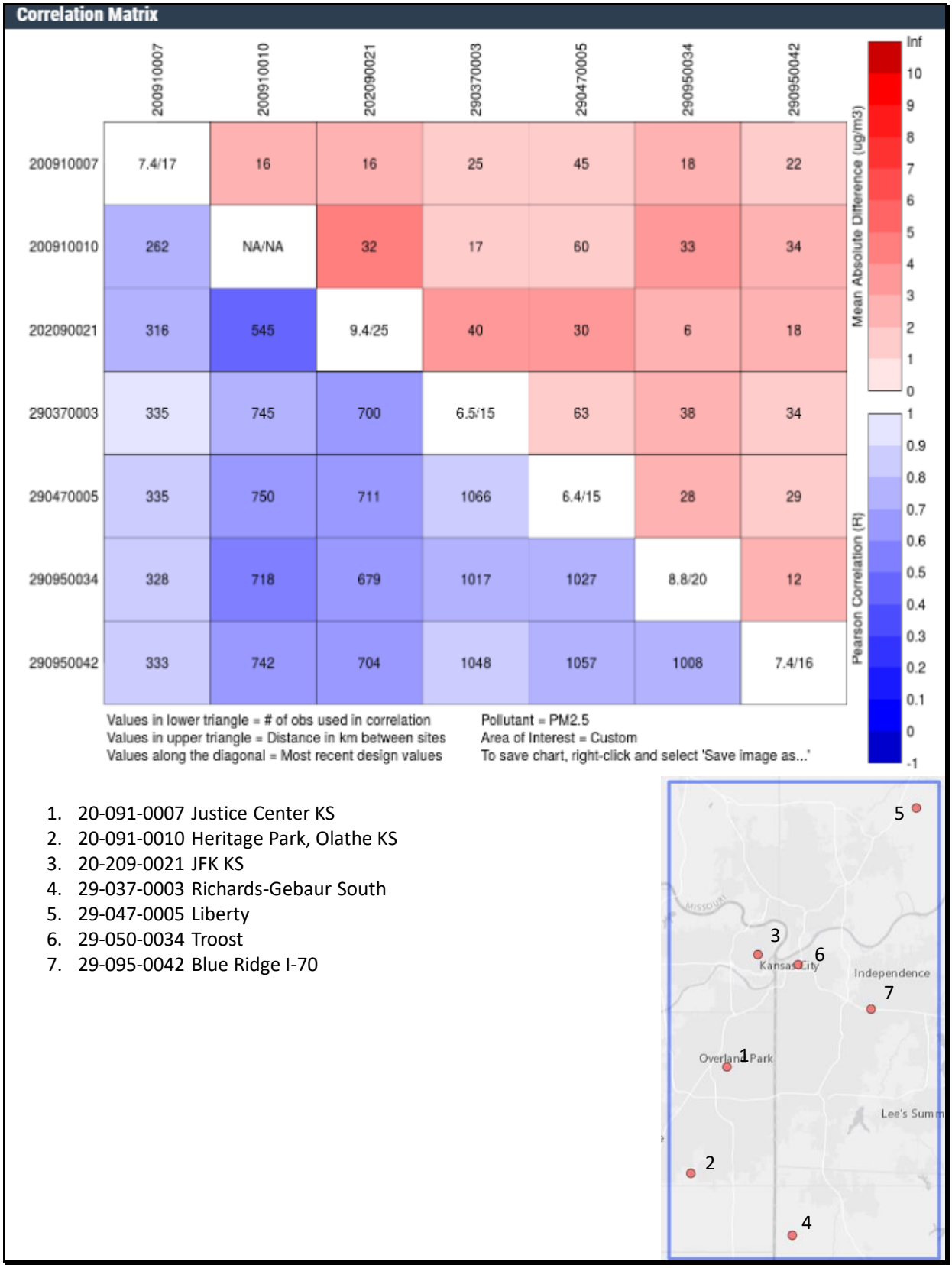


Figure 10-5. Correlation Matrix for Kansas City Area $PM_{2.5}$ Sites

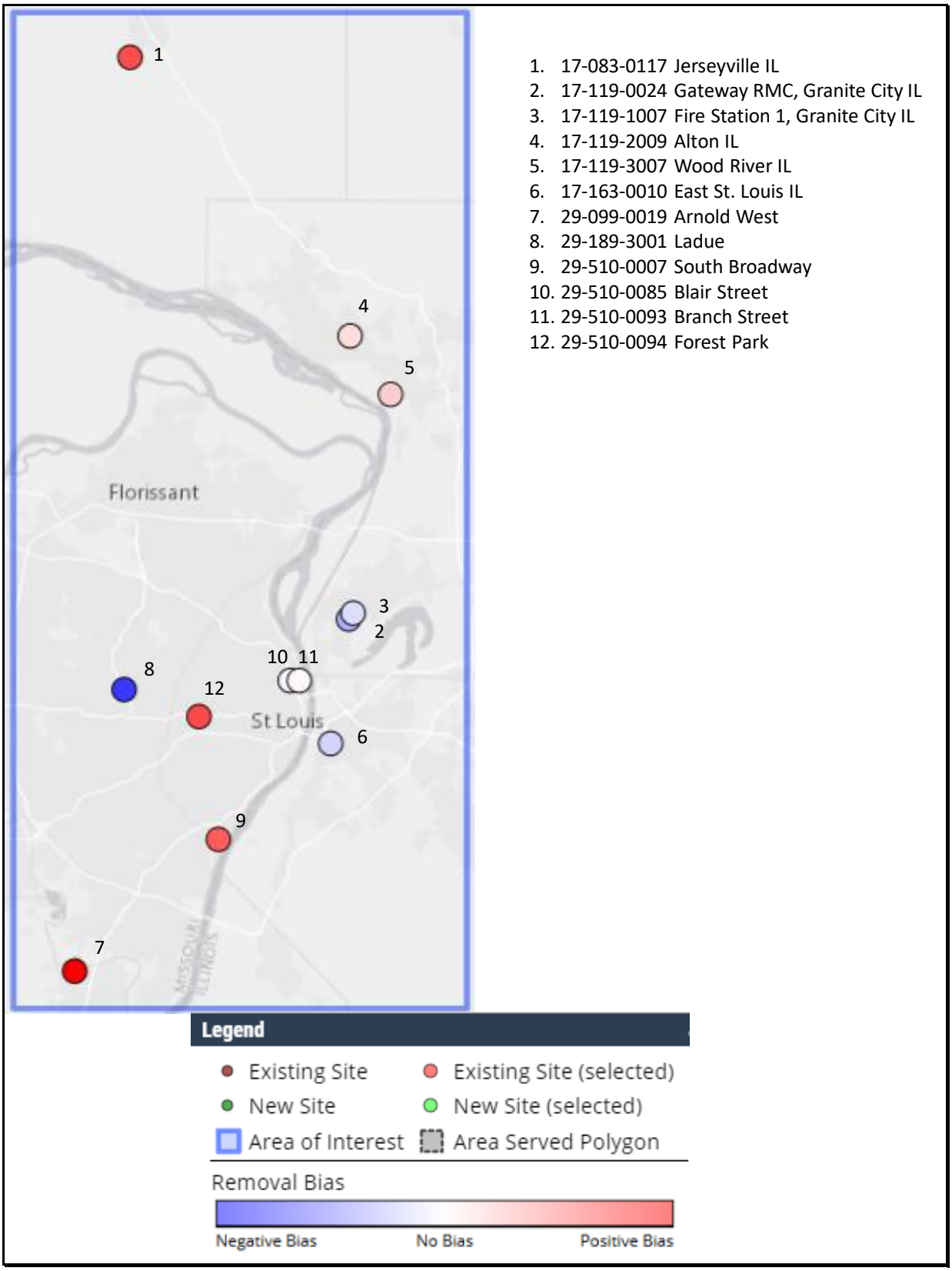


Figure 10-6. Removal Bias for St. Louis Area $PM_{2.5}$ Sites

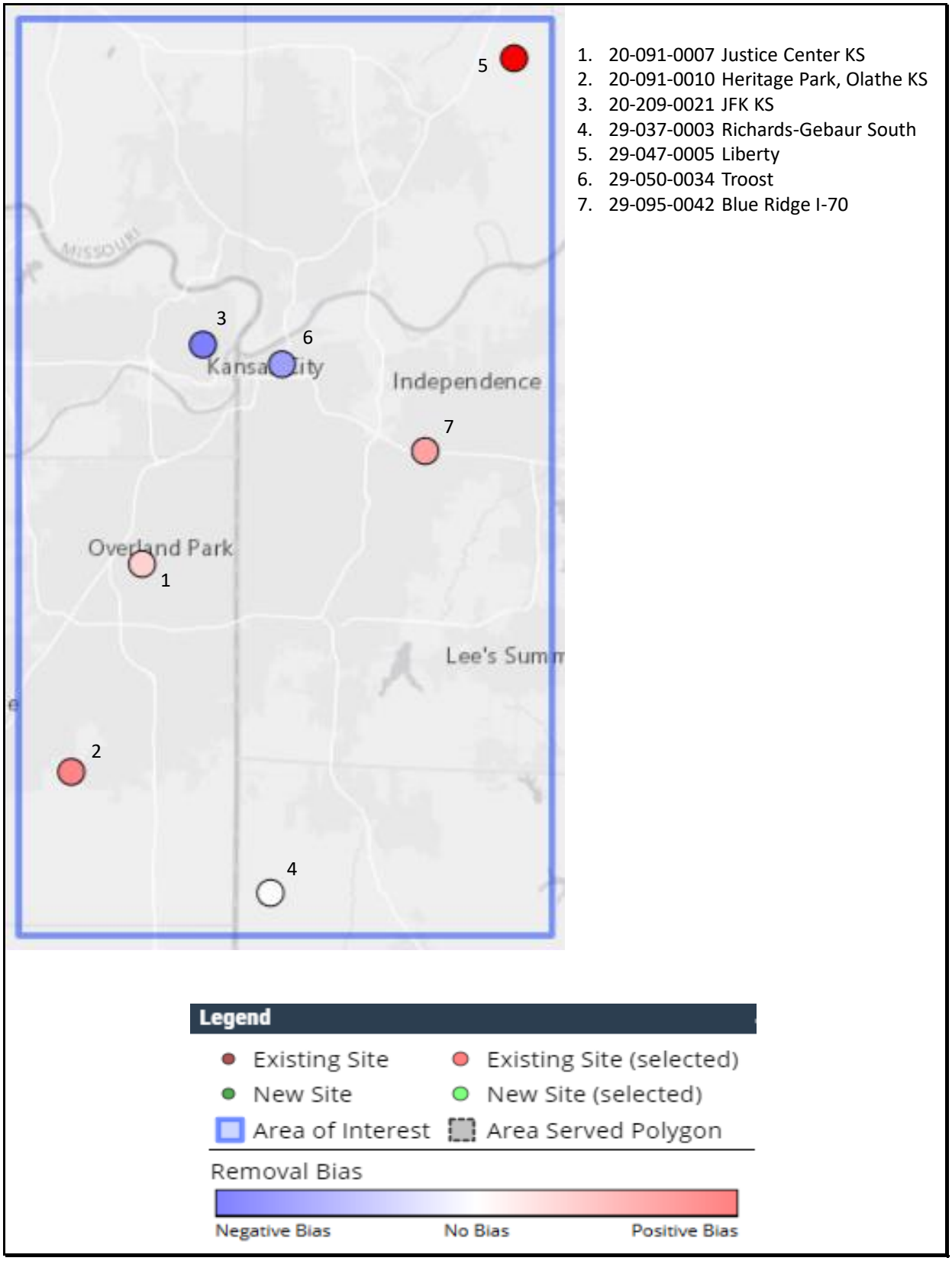


Figure 10-7. Removal Bias for Kansas City Area $PM_{2.5}$ Sites

10.3 $PM_{2.5}$ and Precursor Emissions

Fine particulate matter is chiefly composed of the effluent from combustion processes taking place in fossil fuel-fired power plants, transportation, industry, agriculture, construction, waste disposal and other sectors. In addition to the primary $PM_{2.5}$ directly emitted from these processes, the majority of airborne $PM_{2.5}$ is secondary, formed downstream from emission points by the condensation of sulfur and nitrogen oxides (SO_X and NO_X), volatile organic compounds (VOC) and ammonia (NH_3) emitted by these same processes. The same sources that emit $PM_{2.5}$ and its precursors are largely responsible for emissions of the VOC and NO_X that cause the formation of ozone as well. Therefore, in addition to direct $PM_{2.5}$ emission sources, sources of PM_{10}, SO_X, NO_X, VOC, and NH_3 also contribute to atmospheric $PM_{2.5}$.

$PM_{2.5}$ speciation results in the St. Louis area indicate the species contributing most of the $PM_{2.5}$ mass are ammonium sulfate, ammonium nitrate and carbonaceous material (organic compounds and elemental carbon). The sulfate contribution is highest in the summer, and the nitrate contribution is highest in the winter. Analysis of speciation results on summer days with high mass concentration shows the excess over average summer days is dominated by ammonium sulfate, which is widespread in the region. The combined effect of the regional and urban emissions in the area is to create levels of $PM_{2.5}$ during high pollution events that, in St. Louis, are primarily due to either regional sources of sulfate or urban-wide/regional sources of nitrate and carbonaceous material.

Comparison of $PM_{2.5}$ mass and speciation measurement results for the St. Louis area to results for rural areas shows an urban excess of 4 to 6 $\mu g/m^3$, which (on an annual basis) is predominantly carbonaceous material (organic compounds and elemental carbon) and nitrate. Differences in these species (carbonaceous material and nitrate) also appear between urban core and suburban sites in the St. Louis area. Sulfate, on the other hand, appears to be more regional, with sulfate concentrations being higher in eastern Missouri and lower in western Missouri, likely because of the relative proximity to coal combustion sources in the general area along the Ohio River.

Airborne $PM_{2.5}$ in the St. Louis area is dominated by the impact of regional or urban-scale influences and by the contribution of secondary sources, and large SO_X and NO_X sources generally have tall stacks that reduce their near-source impact. However, it is still worthwhile to consider the location of emission sources, in order to help ascertain that source influences are not being either overlooked or overemphasized because of the location of monitoring stations. Figure 10-8 shows the locations of primary $PM_{2.5}$ point sources, which are somewhat concentrated in the Kansas City and St. Louis areas. The locations of SO_2, NO_X, and VOC sources are shown in other sections of this assessment. Figure 10-9 shows the locations of $PM_{2.5}$ area sources by county, concentrated in the more populated areas of the state. Figure 10-10 shows the locations of ammonia sources by county, concentrated in areas with agricultural activities.

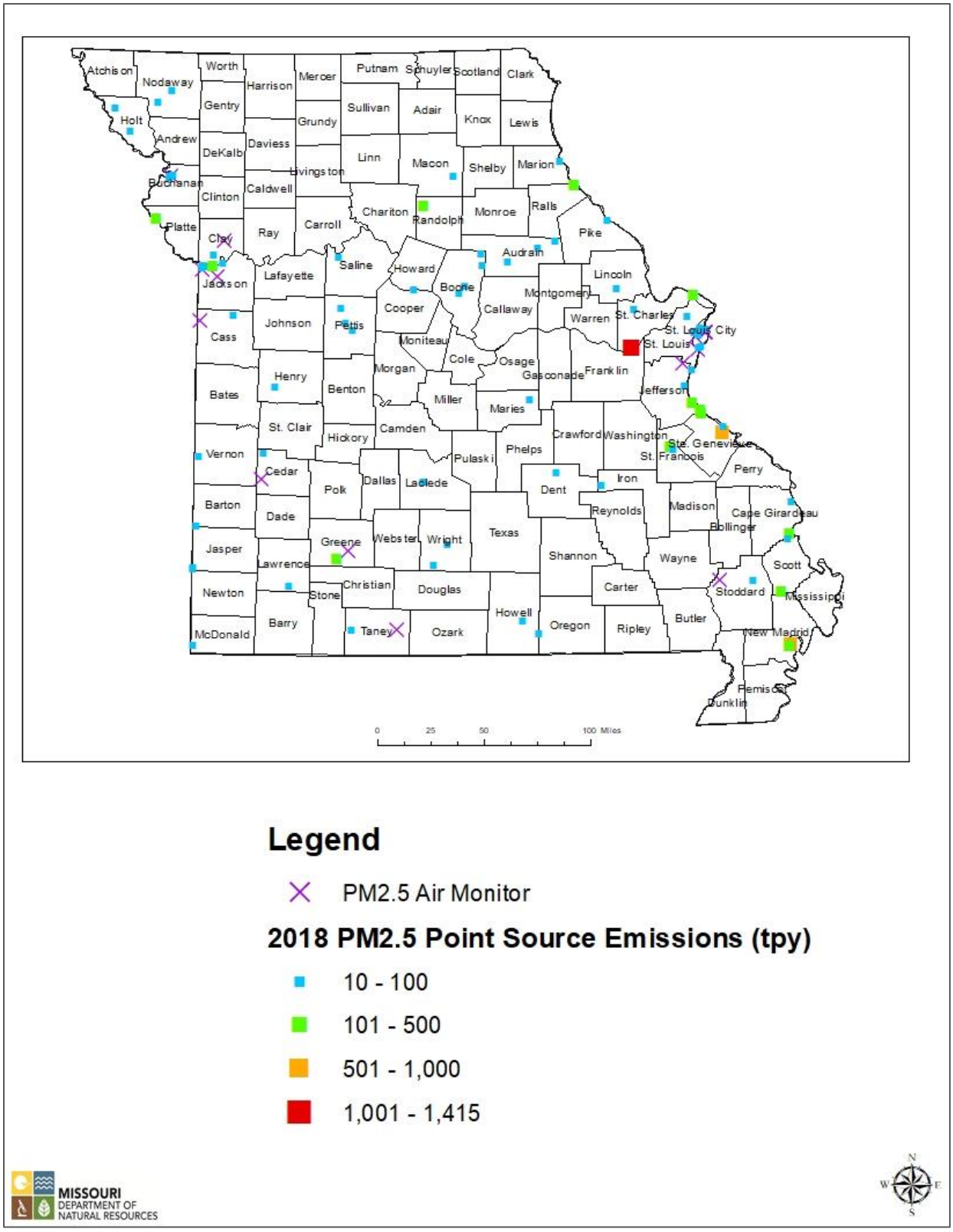


Figure 10-8. 2018 Statewide $PM_{2.5}$ Point Source Emissions and the 2020 $PM_{2.5}$ Monitoring Network

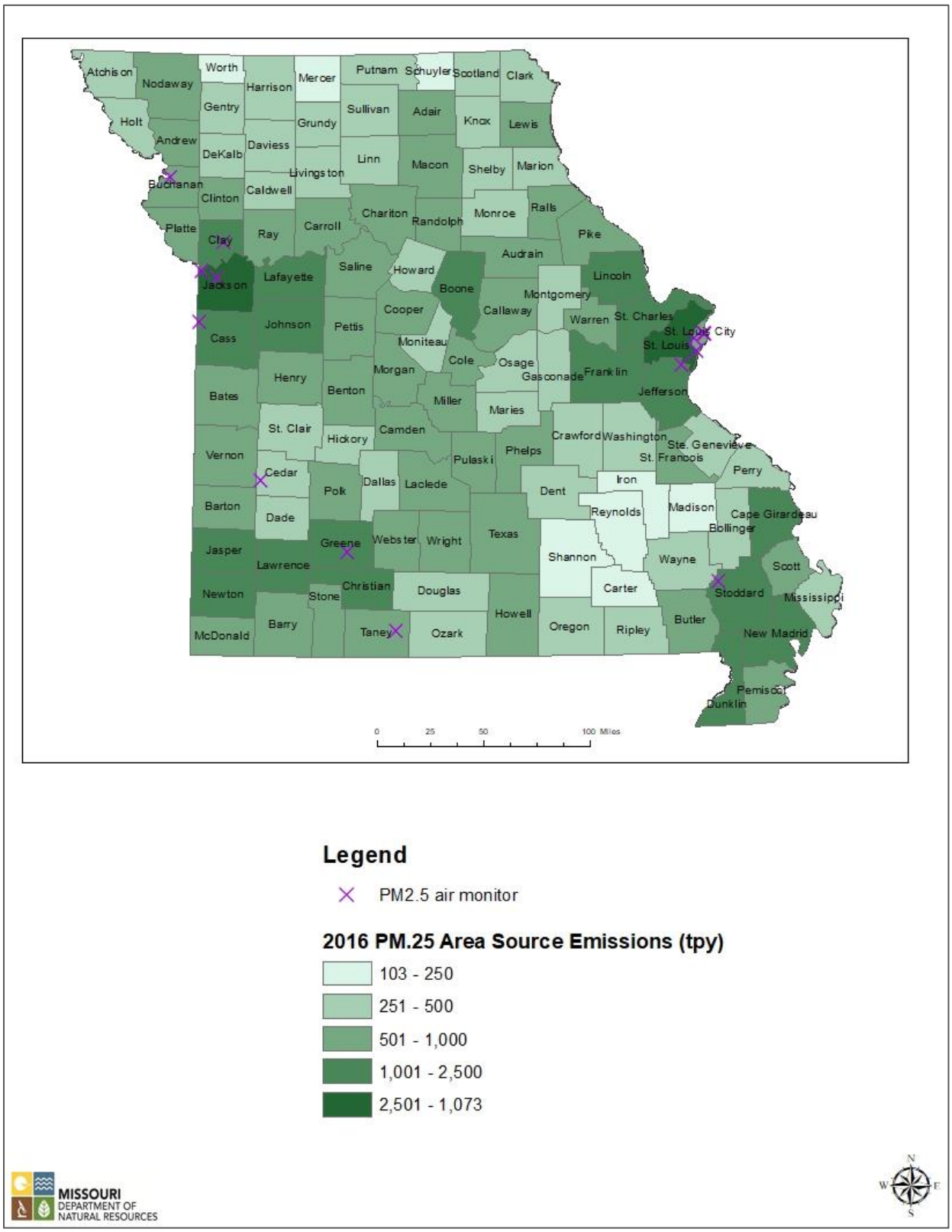


Figure 10-9. Statewide $PM_{2.5}$ Area Source Emissions for 2016 and the 2020 $PM_{2.5}$ Monitoring Network

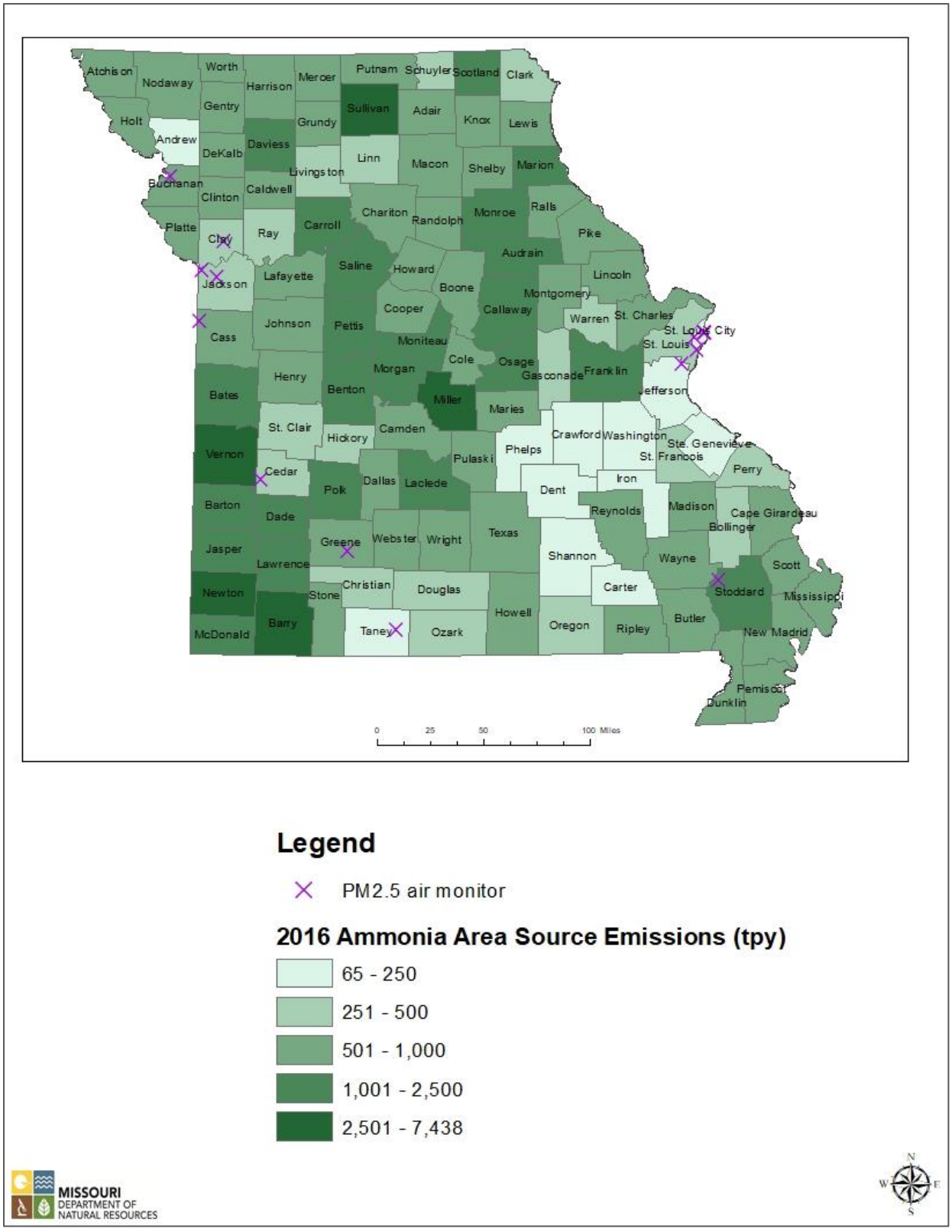


Figure 10-10. Statewide Ammonia Area Source Emissions for 2016 and the 2020 $PM_{2.5}$ Monitoring Network

10.4 Evaluation of the $PM_{2.5}$ Monitoring Network

All of the 24-hour $PM_{2.5}$ design values are less than 85% (29.75 µg/m^3) of the standard. For the annual standard, the highest applicable St. Louis area design value is 9.2 µg/m^3 (Ladue), and the highest Kansas City area design value is 8.2 µg/m^3 (Troost). These design values are less than 85% (10.2 µg/m^3) of the standard. Therefore, based on Table 10-1, a minimum of two $PM_{2.5}$ sites is required in each of these areas.

The annual design value at the Hillcrest High School site in Springfield and at the St. Joseph site are both less than 85% of the standard, so no sites are required based on Table 10-1.

Table 10-4 summarizes the required numbers of $PM_{2.5}$ monitoring sites based on Table 10-1 and the current numbers of sites. The required minimum numbers of sites are exceeded in each MSA.

Table 10-4. Required and Current Numbers of $PM_{2.5}$ Monitoring Sites in Missouri

MSA	Required Minimum Number of $PM_{2.5}$ Monitoring Sites	Current Number of $PM_{2.5}$ Monitoring Sites in MSA within Missouri
St. Louis	2	6
Kansas City	2	4
Springfield	0	1
Joplin	0	0
Columbia	0	0
Jefferson City	0	0
St. Joseph	0	1
Cape Girardeau	0	0
(not in a MSA)	0	1

Continuous $PM_{2.5}$ monitors must be operated at a minimum of half of the required sites (40 CFR Part 58, Appendix D). Continuous monitors are now being operated at all of the sites, and collocated FRM and FEM instruments are being operated at two sites in the St. Louis. Collocated FEM instruments are being operated at the St. Joseph site. Three collocated instruments at 13 sites meet the requirement for 15% collocation.

In addition to the minimum numbers of sites in each MSA, each state must monitor at one regional background site and one regional transport site. El Dorado Springs is a regional background site in southwest Missouri. The Liberty site, generally downwind of Kansas City and the Alton IL site, generally downwind of St. Louis, provide regional transport information.

In addition to sites identified above, $PM_{2.5}$ speciation samplers are located at Blair Street in St. Louis and Arnold West, a suburban site south of St. Louis. IMPROVE samplers (operated by other agencies) are located at Mingo National Wildlife Refuge and Hercules Glades Wilderness.

In the St. Louis area, the Blair Street site is critical, in part because of its designation as an NCore site, and because of its location near the urban center and several large industrial sources. The Branch St. site is near the Blair Street site, but is located in a significant PM emission source area, so is also critical. The South Broadway and Ladue sites are fairly well correlated, but are 13 kilometers apart. The South Broadway site is more generally upwind of the central St. Louis area. Also, the Ladue site has a high negative removal bias. Therefore, the South Broadway and Ladue sites are both judged as critical. The Arnold West site is an important suburban site, generally downwind of the nearby Ameren UE Meramec plant and generally upwind of the central St. Louis area and also provides important speciation data so is judged to be critical. The Forest Park site is critical because $PM_{2.5}$ monitoring collocated with near-road NO_2 monitoring is required at a minimum of one site in an MSA with a population of 1 million or larger.

In the Kansas City area, the Troost site is critical, because it is the only $PM_{2.5}$ site near the center of the Kansas City metropolitan area. The Liberty site is critical because it is the only $PM_{2.5}$ site generally downwind of the Kansas City area. The Richards Gebaur South site is judged to be critical, because it provides important upwind background data for the Kansas City area. The Blue Ridge I-70 site is a required near roadway site in the Kansas City CBSA with a population of 1 million or larger and is therefore critical.

The Hillcrest High School site (relocated from MSU) is the only $PM_{2.5}$ site in the Springfield area and is therefore judged to be critical.

In the remainder of the state, the El Dorado Springs site is considered to be critical, because it provides important rural, regional background data for the Kansas City area. The St. Joseph site is critical, because it is the only site in the St. Joseph area.

11.0 Lead Network Assessment

11.1 Introduction: Lead Standards and Monitoring Requirements

The level of the primary and secondary NAAQS for airborne lead is 0.15 $\mu g/m^3$, measured as total suspended particulate matter (TSP). The form of the standard is the rolling three-month average of monthly averages. The rolling three-month average considers each of the 12 three-month periods associated with a given year, not just the four calendar quarters within that year. Attainment of the standard is evaluated over a three-year period. The NAAQS are listed in the EPA NAAQS Table on the internet. The lead NAAQS were most recently reviewed and retained in October 2016.

At a minimum, monitors must be placed in areas potentially impacted by sources of lead emissions greater than or equal to one-half ton per year. EPA Regional Administrators may waive the source-oriented monitoring requirements if the monitoring agency can demonstrate that emissions from the source will not contribute to maximum air lead concentrations greater than 50% of the standard.

11.2 Lead Monitoring Results in Missouri

The lead monitoring network in Missouri is shown in Figure 11-1. There are 10 state-operated monitoring sites in Missouri: four in the Herculaneum area, one in the old lead belt area, three in the new lead belt area, one near a facility in northwest Missouri and one in St. Louis. At the Blair St. site in St. Louis, lead is measured along with other metallic species using a PM_{10} sampler as a part of the National Air Toxics Trends Stations (NATTS) program, not for purposes of NAAQS compliance. All of these sites except the Blair St. site are located near identified or potential lead sources related to current or past lead mining, processing or remediation activities. As indicated in the figure, there are also several sites operated by the Doe Run Company in the Herculaneum and new lead belt areas.

Table 11-1 lists design values (maximum three-month rolling average concentrations during a three-year period) for the state and industry-operated sites. Figure 11-2 shows time-series graphs of these design values. As noted above and discussed in more detail below, annual maxima are decreasing, and design values are expected to be below the level of the standard in future years.

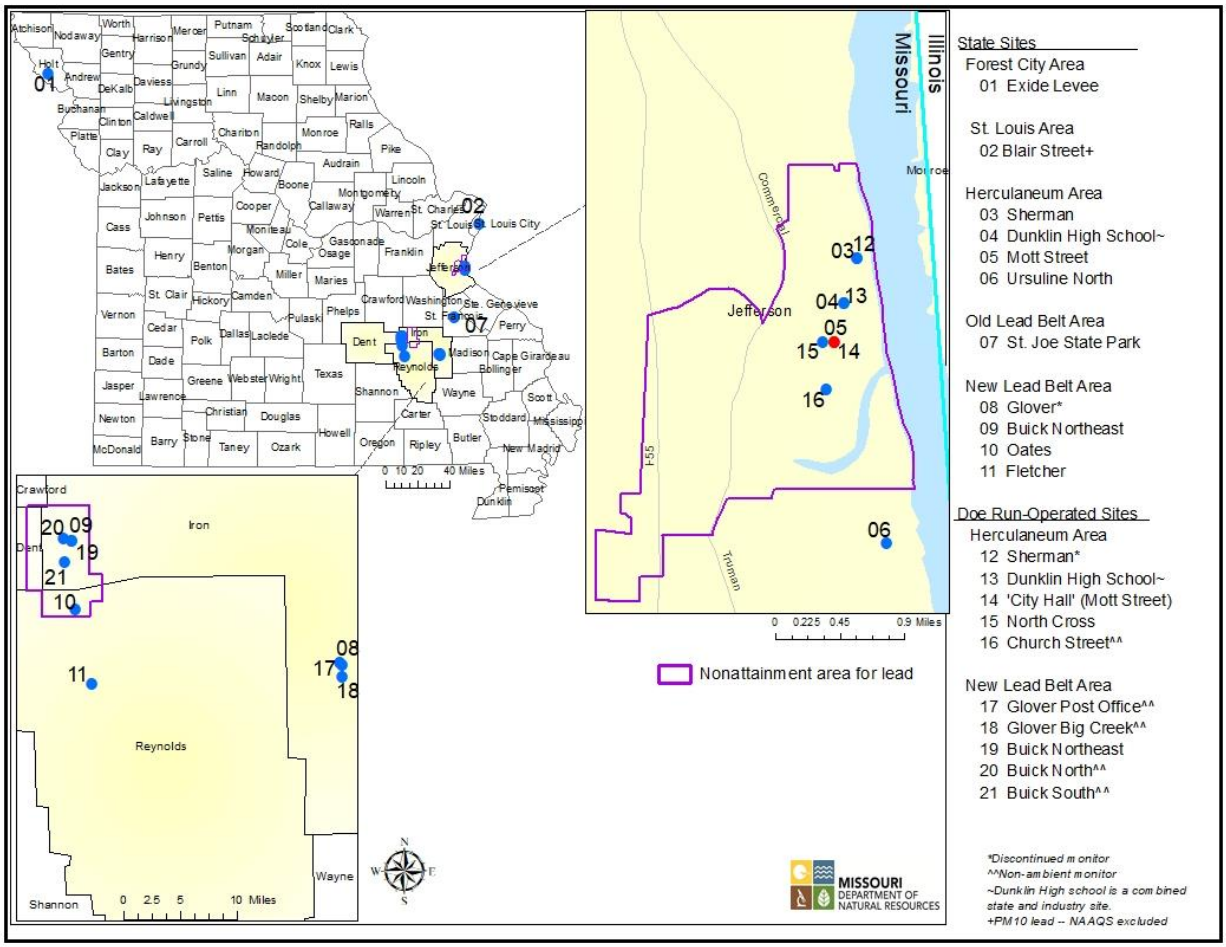


Figure 11-1. 2020 Missouri Lead Monitoring Network

Table 11-1

Lead Design Values (maximum 3-month average of monthly averages in µg/m^3					
State Operated Lead Sites					
	13-15	**14-16**	**15-17**	**16-18**	**17-19**
Exide Levee	0.73	0.15	0.02	0.02	0.02
Blair Street*	0.03	0.02	-	-	-
Herculaneum- Sherman	0.26	0.13	0.04	0.04	0.04
Herculaneum- Dunklin High School	0.31	0.14	0.06	0.11	0.11
Herculaneum- Mott Street	0.66	0.32	0.21	0.21	0.21
Ursuline North	0.07	0.05	0.01	0.01	0.01
St. Joe State Park	0.08	0.05	0.03	0.03	0.03
Glover*	0.26	0.08	0.07	0.07	0.02
Buick NE	0.33	0.26	0.19	0.19	0.13
Oates	0.09	0.06	0.04	0.04	0.04
Fletcher	0.03	0.05	0.05	0.05	0.03
Pevely*	0.07	0.04	0.02	0.02	-
Pevely North*	0.06	0.03	0.01	0.01	0.01
Bills Creek*	0.05	0.03	0.02	0.02	0.01
Industry Operated Sites					
Herculaneum- Sherman*	0.26	0.15	0.04	0.02	0.05
Herculaneum- Dunklin High School	0.31	0.14	0.09	0.11	0.11
Herculaeum- Mott Street	0.66	0.36	0.23	0.23	0.23
Herulaneum- North Cross	0.45	0.16	0.11	0.11	0.10
Herclaneum- Church Street~	-	-	-	-	-
Glover- Post Office~	0.63	0.10	0.08	-	-
Glover- Big Creek~	0.06	0.06	0.10	-	-
Buick NE	0.35	0.22	0.16	0.16	0.13
Buick- North~	-	-	-	-	-
Buick- South~	-	-	-	-	-
*Discontinued Monitors					
~Non-Ambient Monitor					
AQS No longer calculates Design Values for non-ambient monitors					
Blair Street is part of the NATTS program and is NAAQS excluded					

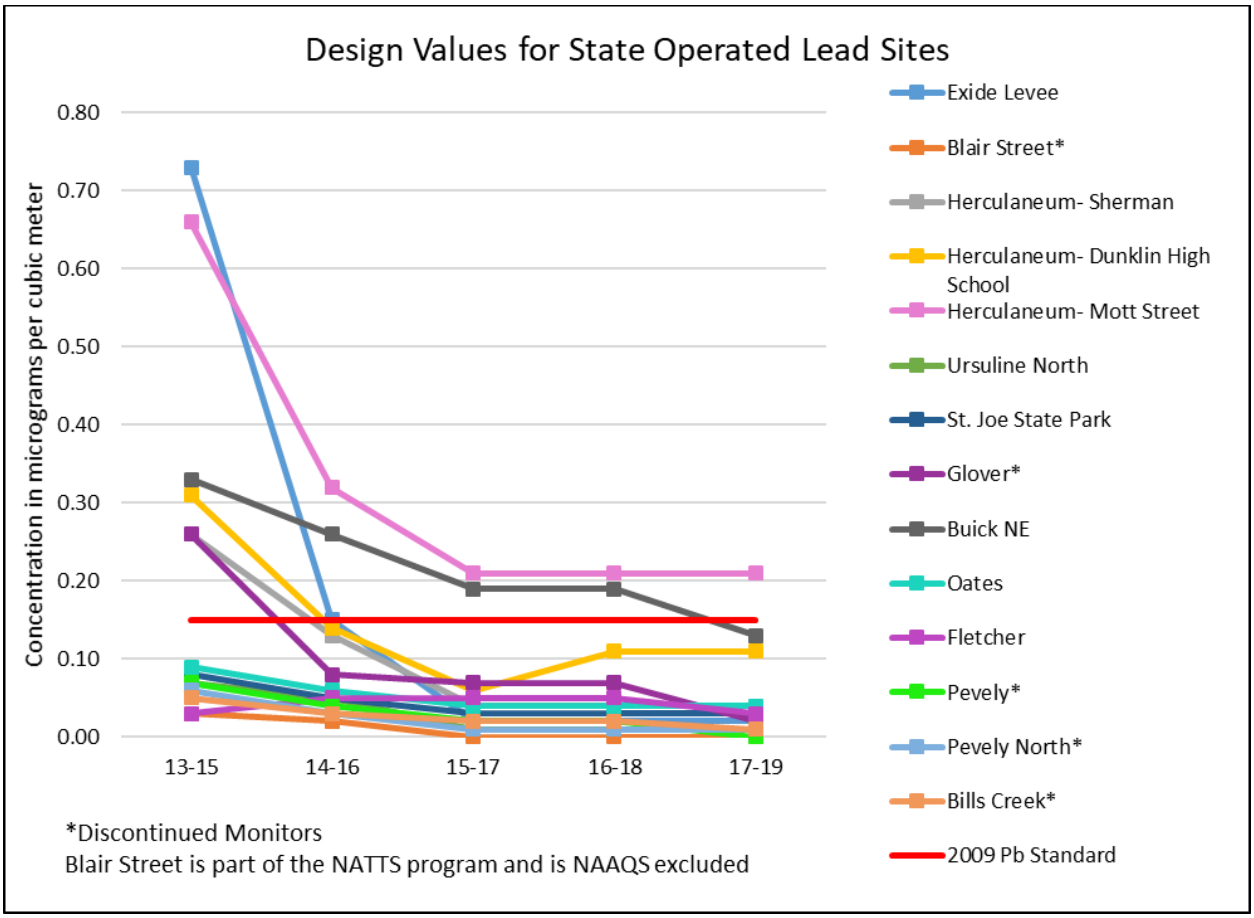


Figure 11-2a. Design Values for State Operated Lead Sites

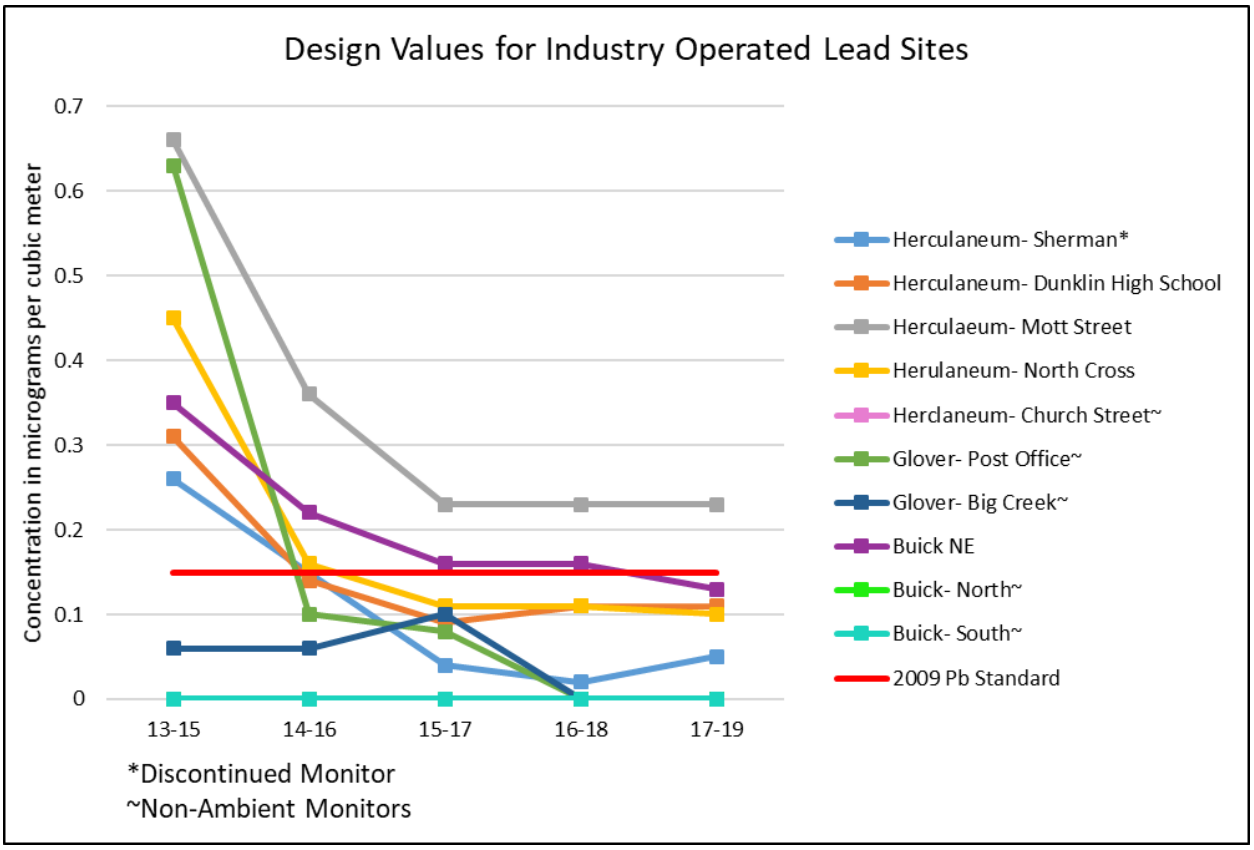


Figure 11-2b. Design Values for Industry Operated Lead Sites

11.3 Lead Emissions

Figure 11-3 shows point sources of lead emissions, including the Herculaneum smelter, the Buick secondary smelter, the Exide secondary smelter and the Buick, Fletcher and Brushy Creek mines or mills. Total emissions in 2018 from these facilities were 3.3 tons. Primary smelting at Herculaneum was discontinued at the end of 2013. Emission control equipment has been installed at the Buick and Exide secondary smelters. Therefore point source emissions from these facilities are greatly reduced; these reductions will be reflected in future inventories. Figure 11-3 also shows area emissions in Iron and Reynolds counties, possibly from transportation related to mining operations or from tailings areas near mining operations.

Other potential lead sources include electric generating stations. Department staff has obtained waivers from lead monitoring requirements at these facilities on the basis of modeling analysis indicating that ground level airborne lead concentrations near these facilities do not exceed the level of the standard. As stated in the 2019 Monitoring Network Plan, Department staff reviewed the 2014 National Emissions Inventory (NEI) and did not identify any additional lead sources emitting greater than 0.50 tons of lead per year for which ambient air monitoring is not currently being conducted or where EPA has not already granted a modeling waiver consistent with 40 CFR, Part 58 Appendix D. Department staff will review the 2017 NEI lead data, re-evaluate electric generating stations (and request waivers if appropriate), and evaluate any newly

identified sources as part of the 2020 Monitoring Network Plan in order to identify any additional necessary lead monitoring locations.

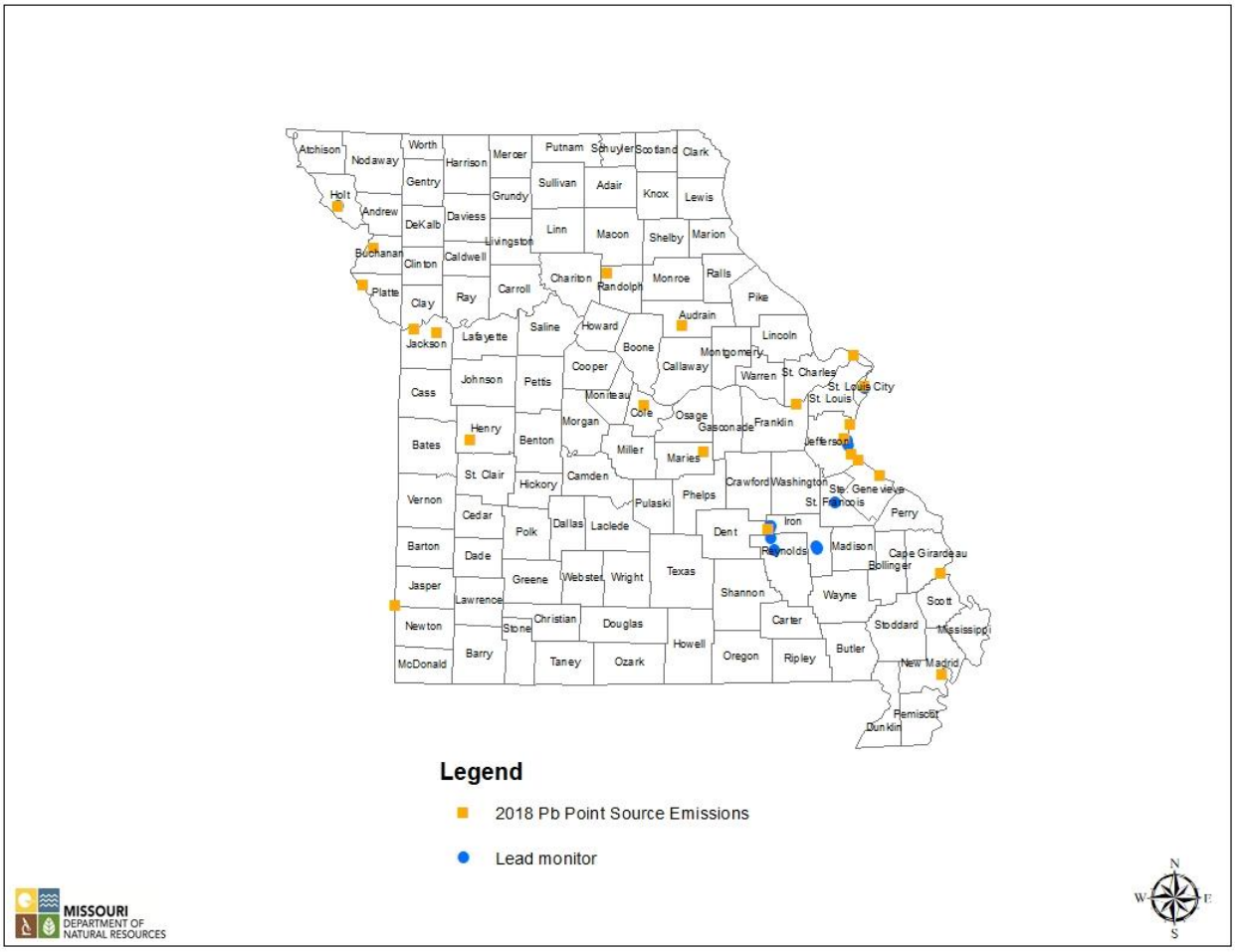


Figure 11-3. 2018 Point Source Lead Emissions and 2020 Monitoring Network

11.4 Evaluation of the Lead Monitoring Network

Operation of the primary smelter at Herculaneum was discontinued at the end of 2013. However, some operations continue at the Herculaneum facility, and there may be considerable lead remaining within the facilities or in waste areas. Also, monitoring must show no exceedance of the standard for at least three years to determine that an area is in attainment, and the last exceedance of the NAAQS was in 2017 as a result of demolition activities at the smelter facility. Therefore, the four monitoring sites in the Herculaneum area (Sherman, Dunklin High School, Mott St. and the background site at Ursuline North) are considered to be critical. The Herculaneum area network will continue to be re-evaluated in future monitoring plans and network assessments, so its makeup may change in the future, but it should be continued in essentially its present configuration for the next few years because of the three-year nature of the standard.

The old lead belt area has multiple areas containing waste (tailings and chat) from past lead mining operations. Remediation activities in the Park Hills area are complete, and the Park Hills site has been discontinued. Remediation activities in St. Joe State Park are also complete, but monitoring at that location is being continued pending EPA approval to discontinue post-remediation monitoring.

Buick and Exide are both secondary smelters. Both facilities have been, or are being modified to include additional emission controls and may show attainment of the standard in the future. The monitor near the Exide facility has not shown an exceedance since 2013, and the monitor near the Buick facility has not shown an exceedance since 2016. However, the monitors near these facilities are critical for the next few years because of potential emissions from these facilities, after which they can be re-evaluated depending on future monitoring results.

The monitors in the vicinity of operating lead mines and mills (Oates and Fletcher) have not shown exceedance of the standard, except for Oates, where the exceedance likely resulted from the Buick secondary smelter, not from the Buick or Brushy Creek mine or mill. However, these sites remain critical because of the level of reported lead emissions from these facilities. These monitors can be re-evaluated in the future depending on monitoring results and on reported emissions.

Appendix A: Wind Roses

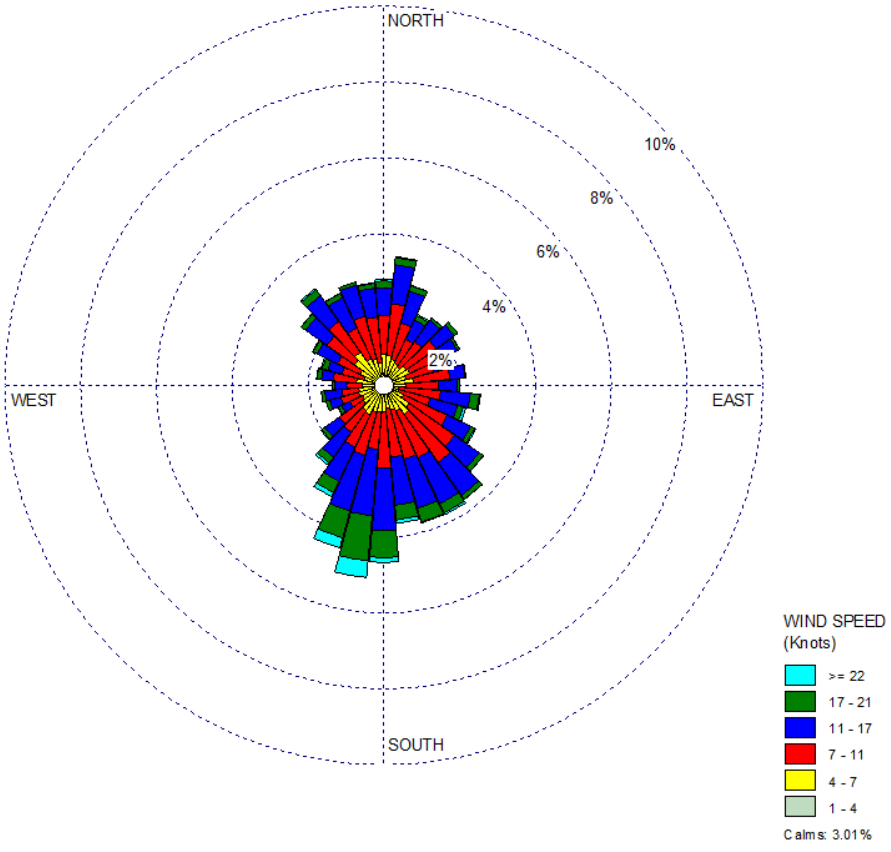
Wind roses based on data from major airports were selected to represent regions in Missouri. The selected airport representing the west was Kansas City International Airport Kansas City (KMCI). For the south, the Springfield Airport (KSGF) was selected, and Lambert-St. Louis International Airport (KSTL) was selected for the east. For the outstate monitor that is located in the northeast section of Missouri, the airport at Kirksville (KIRK) is used. Airport sites report official weather observations for the National Weather Service, and data are archived at the National Climatic Data Center for easy access.

WIND ROSE PLOT:

Kansas City, Mo 2015-2019 Spring (Mar.-Apr.-May) Wind Rose

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS: Official Kansas City Airport (KMCI) Observations.	DATA PERIOD:	COMPANY NAME:	
		MODELER:	
	CALM WINDS: **3.01%**	TOTAL COUNT:	
	AVG. WIND SPEED: **9.54 Knots**	DATE:	PROJECT NO.:

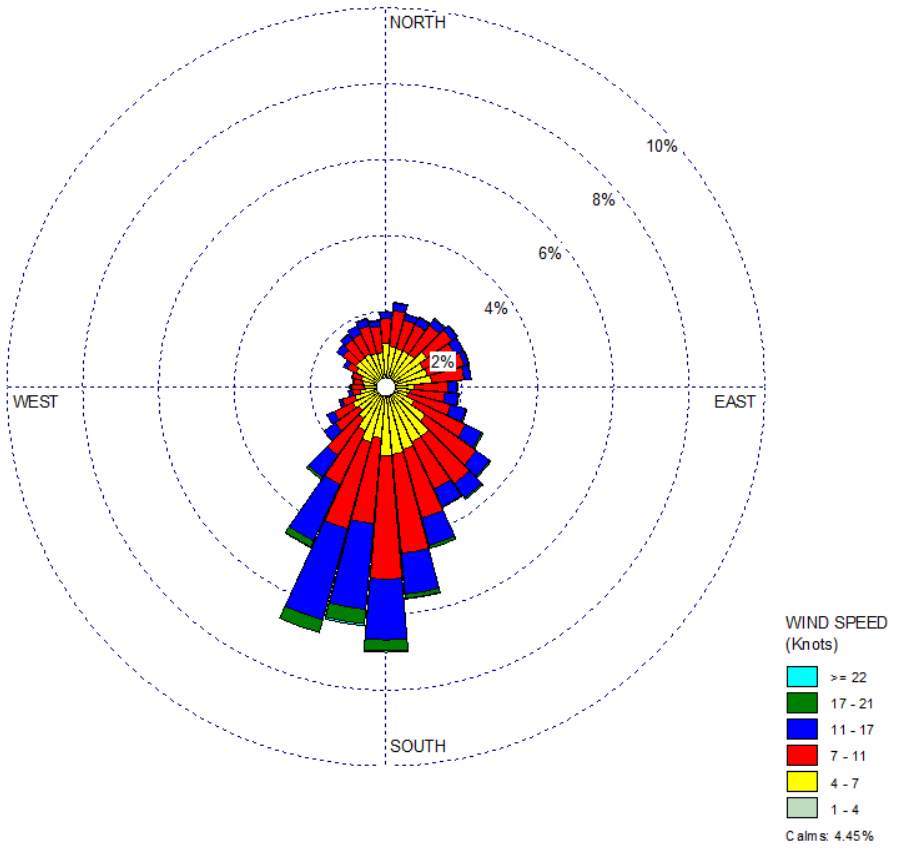
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Kansas City, Mo 2015-2019 Summer (Jun.-Jul.-Aug.) Wind Rose

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
Official Kansas City Airport (KMCI) Observations.		MODELER:	
	CALM WINDS: **4.45%**	TOTAL COUNT:	
	AVG. WIND SPEED: **7.51 Knots**	DATE:	PROJECT NO.:

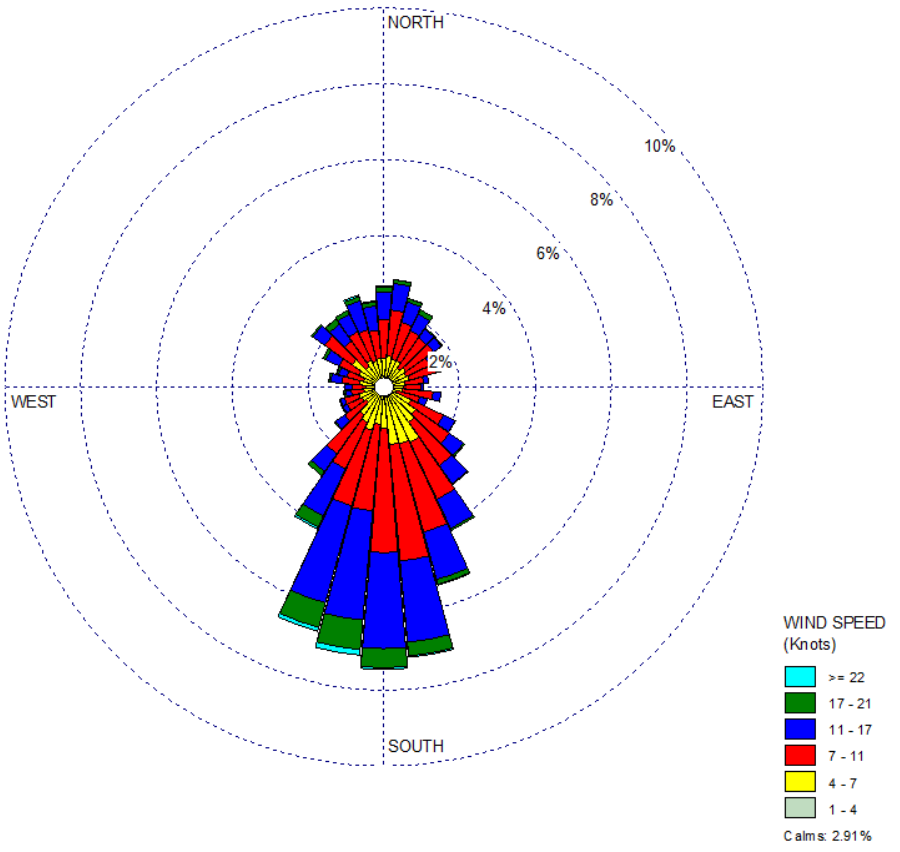
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Kansas City, Mo 2015-2019 Fall (Sep.-Oct.-Nov.) Wind Rose

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
Official Kansas City Airport (KMCI) Observations.		MODELER:	
	CALM WINDS: **2.91%**	TOTAL COUNT:	
	AVG. WIND SPEED: **8.69 Knots**	DATE:	PROJECT NO.:

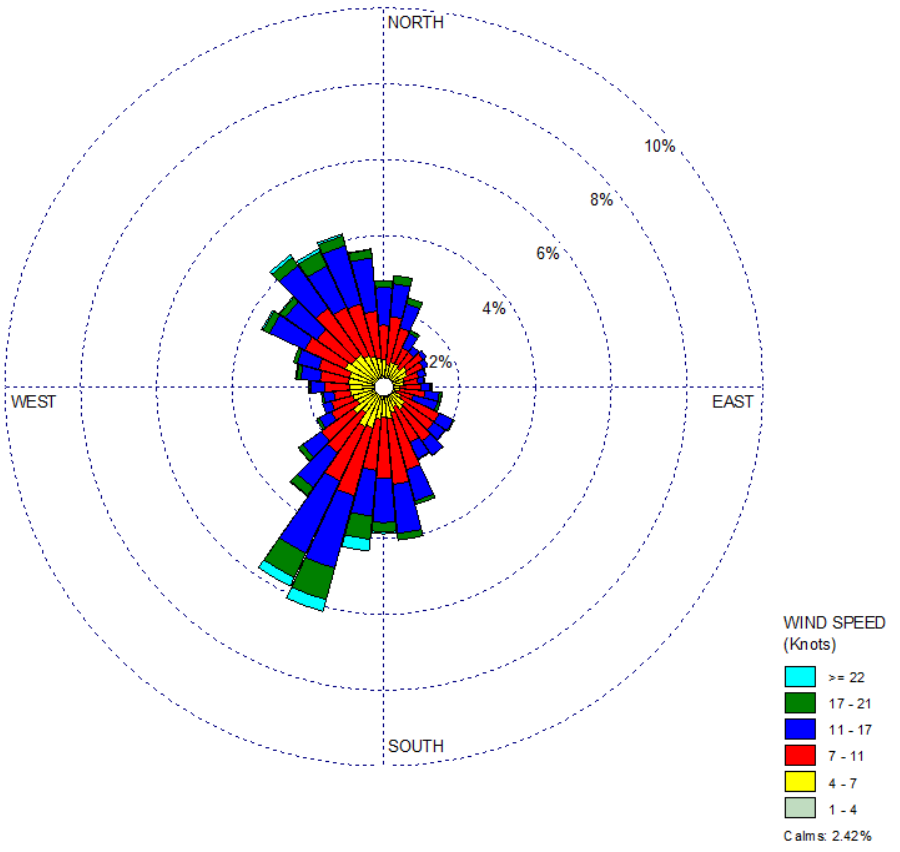
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Kansas City, Mo 2015-2019 Winter (Dec.-Jan.-Feb.) Wind Rose

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS: Official Kansas City Airport (KMCI) Observations.	DATA PERIOD:	COMPANY NAME:	
		MODELER:	
	CALM WINDS: **2.42%**	TOTAL COUNT:	
	AVG. WIND SPEED: **9.23 Knots**	DATE:	PROJECT NO.:

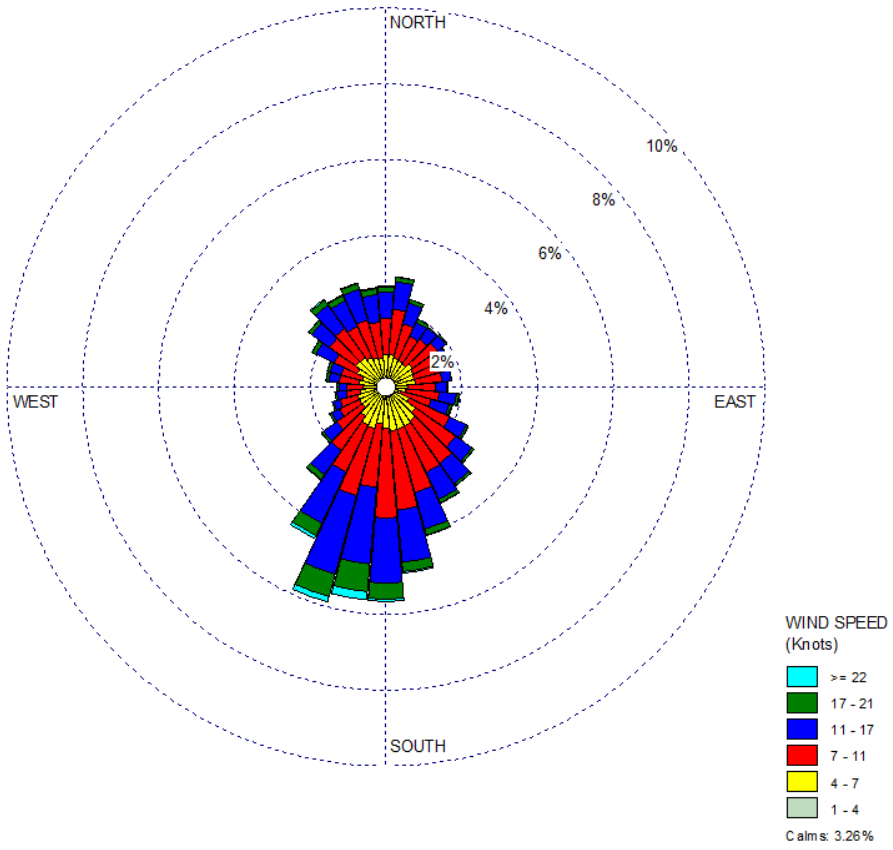
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Kansas City, Mo 2015-2019 Annual Wind Rose

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
Official Kansas City Airport (KMCI) Observations.		MODELER:	
	CALM WINDS: **3.26%**	TOTAL COUNT:	
	AVG. WIND SPEED: **8.73 Knots**	DATE:	PROJECT NO.:

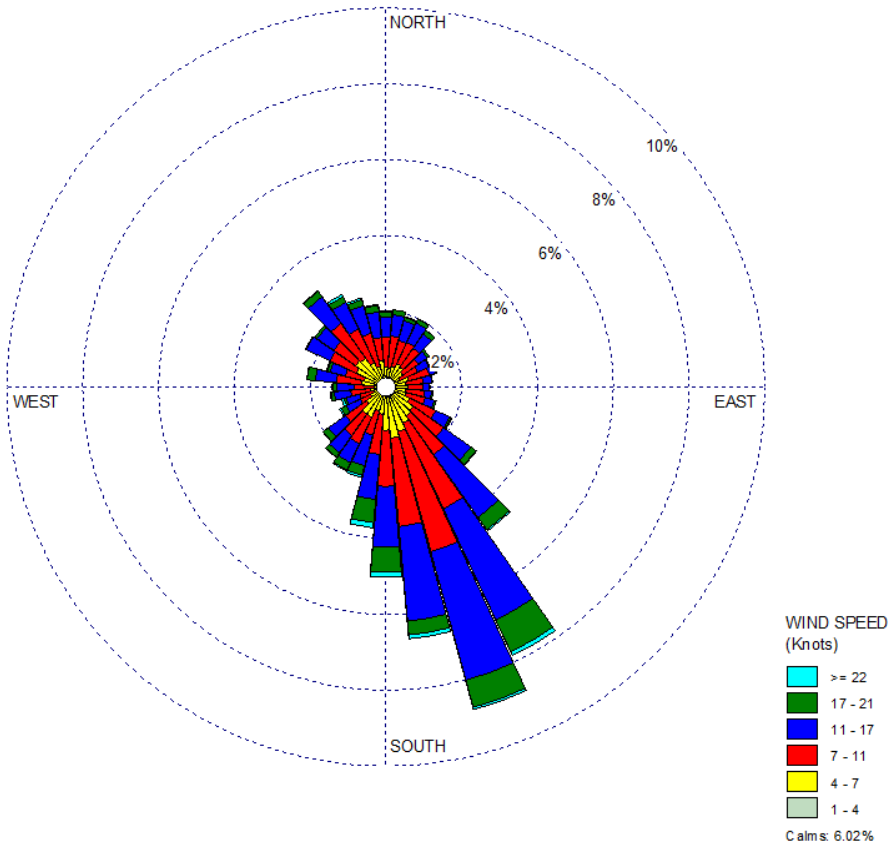
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Springfield, Mo Spring (Mar.-Apr.-May) 2015-2019 Wind Rose

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
Official Springfield (KSGF) Airport Observations.		MODELER:	
	CALM WINDS: **6.02%**	TOTAL COUNT:	
	AVG. WIND SPEED: **9.20 Knots**	DATE:	PROJECT NO.:

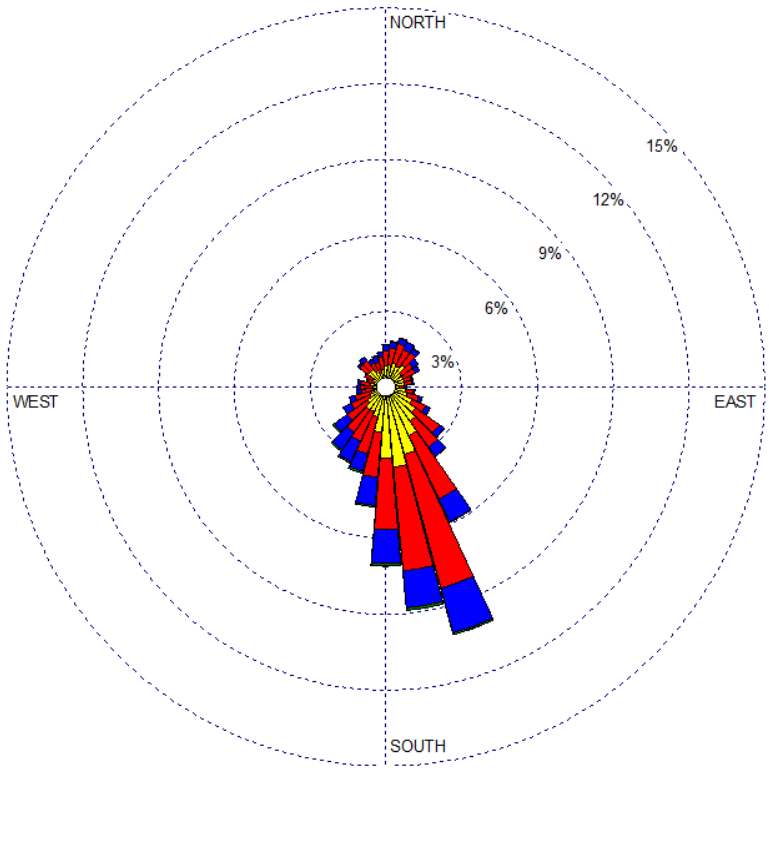
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Springfield, Mo 2015-2019 Summer (Jun.-Jul.-Aug.) Wind Rose

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
Official Springfield (KSGF) Airport Observations.		MODELER:	
	CALM WINDS: **8.70%**	TOTAL COUNT:	
	AVG. WIND SPEED: **6.83 Knots**	DATE:	PROJECT NO.:

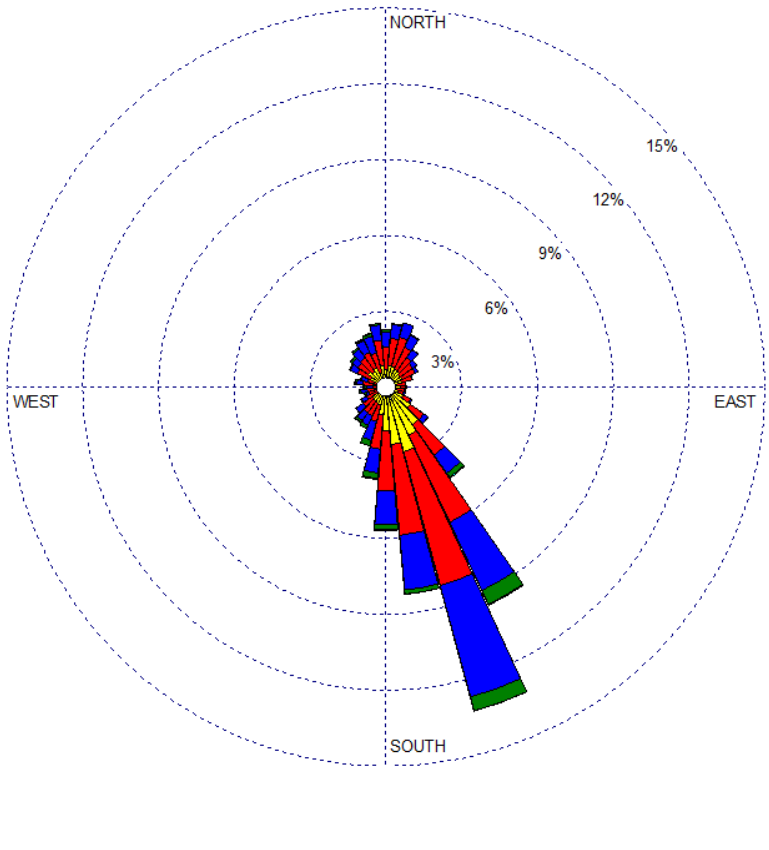
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Springfield, Mo 2015-2019 Fall (Sept.-Oct.-Nov.) Wind Rose

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
Official Springfield (KSGF) Airport Observations.		MODELER:	
	CALM WINDS: **7.33%**	TOTAL COUNT:	
	AVG. WIND SPEED: **7.98 Knots**	DATE:	PROJECT NO.:

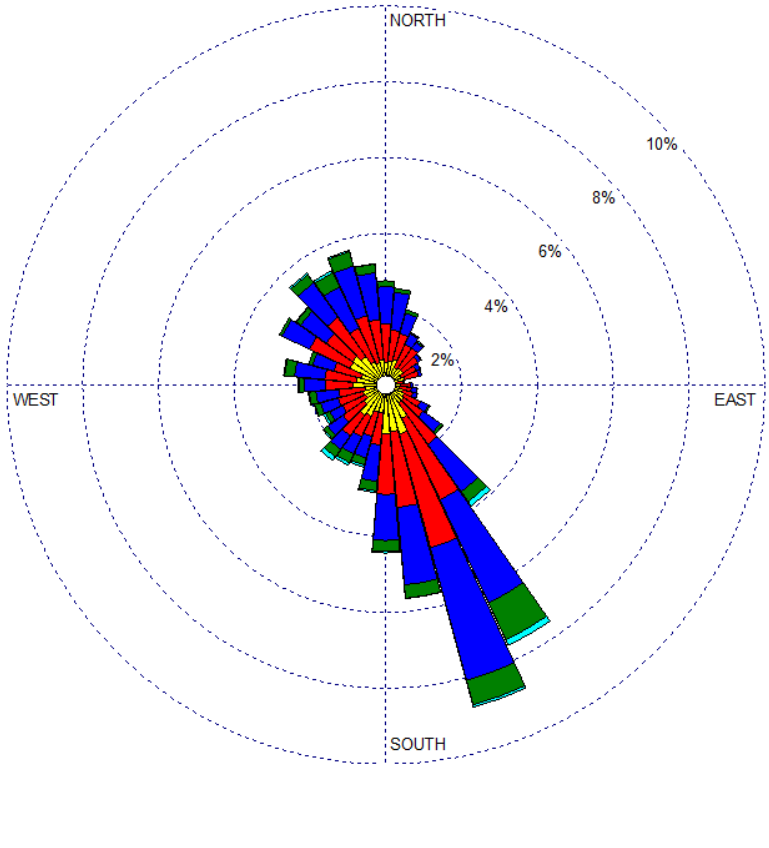
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Springfield, Mo 2015-2019 Winter (Dec.-Jan.-Feb) Wind Rose

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
Official Springfield Airport (KSGF) Observations.		MODELER:	
	CALM WINDS: **5.42%**	TOTAL COUNT:	
	AVG. WIND SPEED: **9.16 Knots**	DATE:	PROJECT NO.:

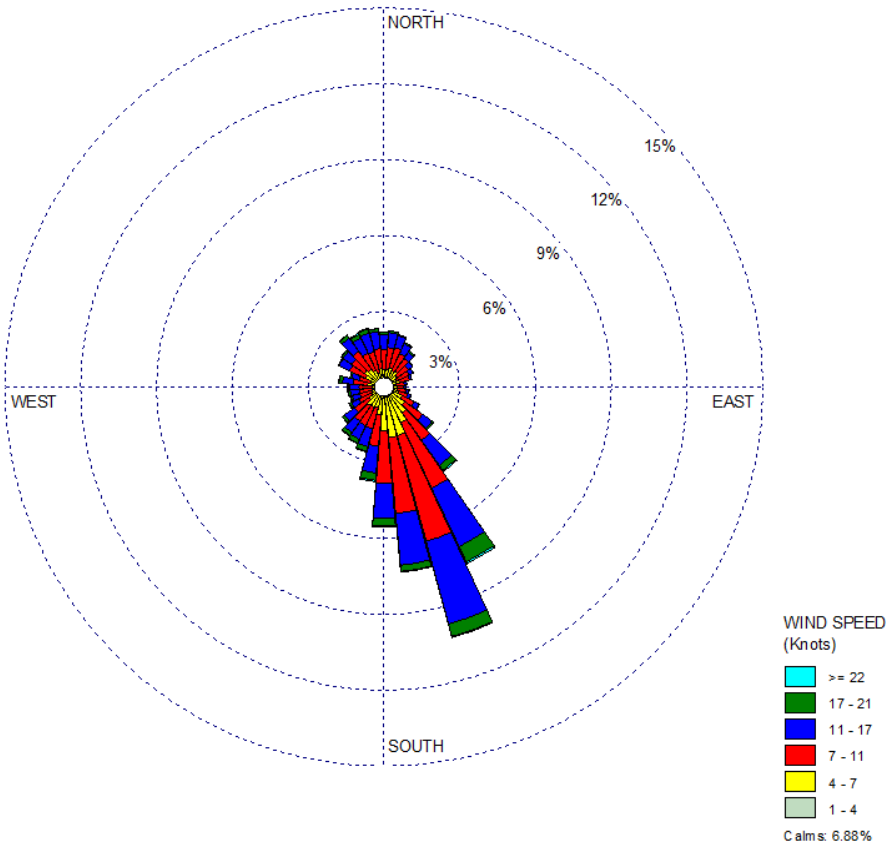
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Springfield, Mo 2015-2019 Annual Wind Rose

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
Official Springfield (KSGF) Airport Observations.		MODELER:	
	CALM WINDS: **6.88%**	TOTAL COUNT: .	
	AVG. WIND SPEED: **8.29 Knots**	DATE:	PROJECT NO.:

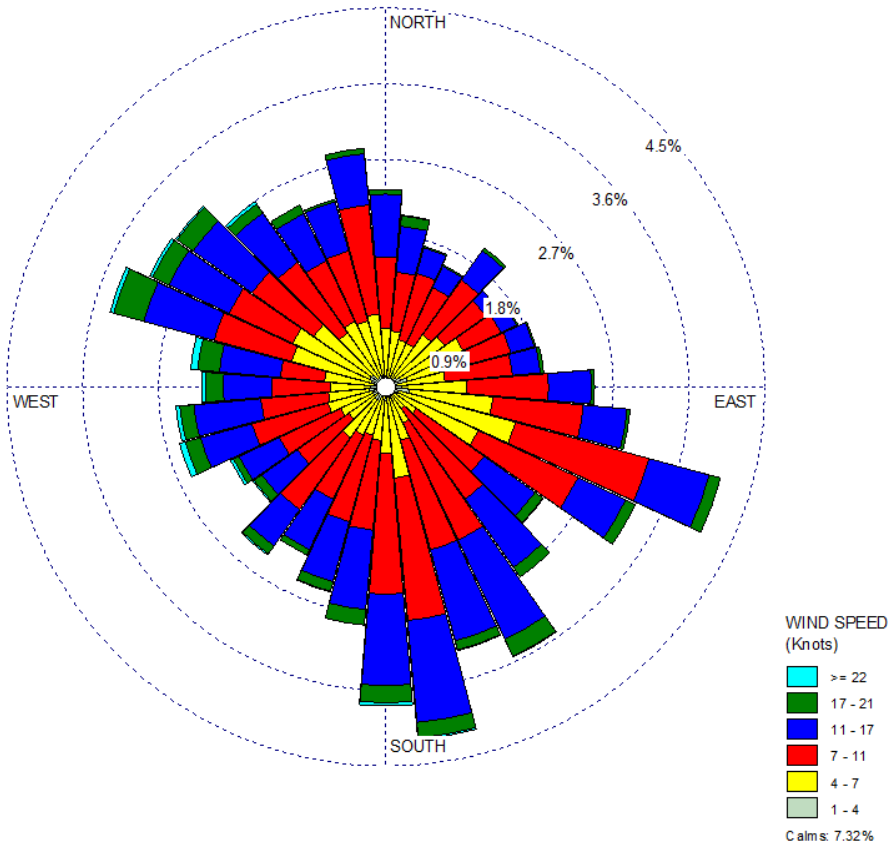
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

St. Louis, Mo 2015-2019 Spring (Mar.-Apr.-May) Wind Rose

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS: Official St. Louis International Airport (KSTL) Observations.	DATA PERIOD:	COMPANY NAME:	
		MODELER:	
	CALM WINDS: **7.32%**	TOTAL COUNT:	
	AVG. WIND SPEED: **8.25 Knots**	DATE:	PROJECT NO.:

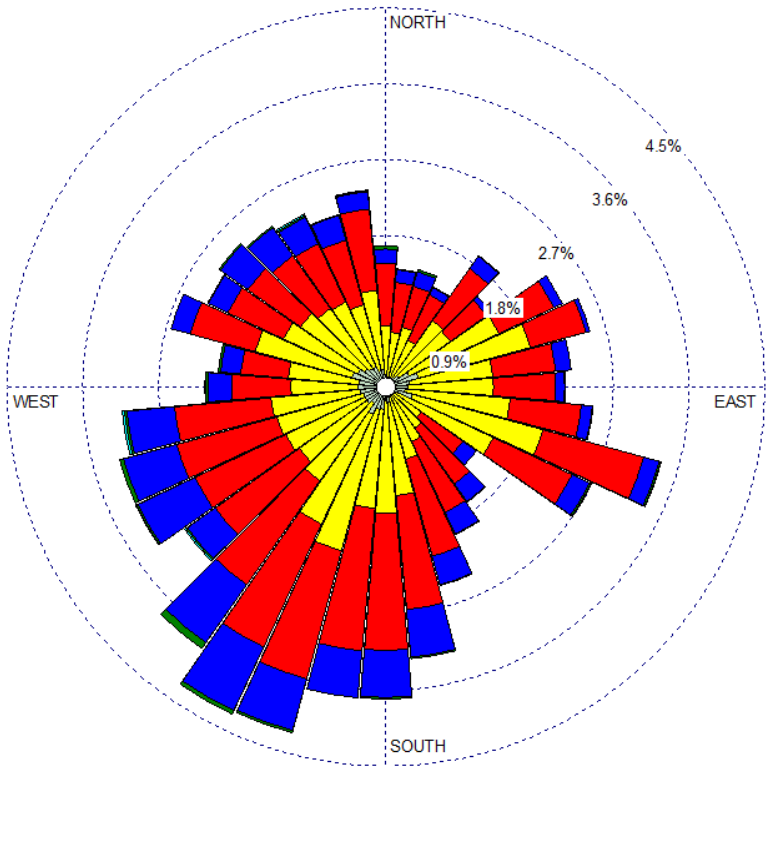
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

St. Louis, Mo 2015-2019 Summer (Jun.-Jul.Aug.) Wind Rose

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
Official St. Louis International Airport (KSTL) Observations.		MODELER:	
	CALM WINDS: **9.19%**	TOTAL COUNT:	
	AVG. WIND SPEED: **6.44 Knots**	DATE:	PROJECT NO.:

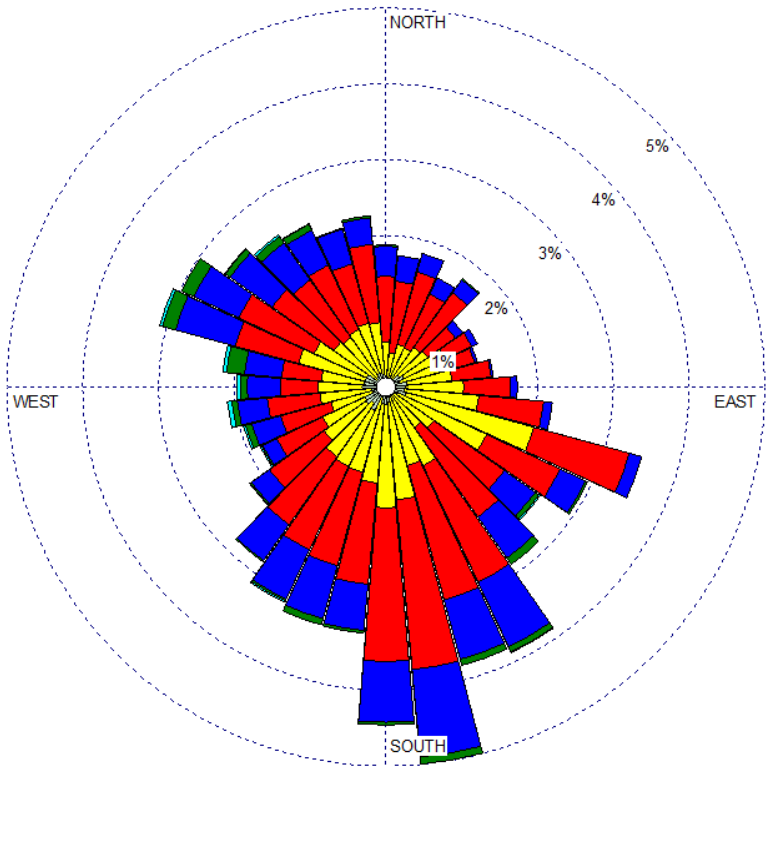
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

St. Louis, Mo 2015-2019 Fall (Sep.-Oct.Nov.) Wind Rose

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
Official St. Louis International Airport (KSTL) Observations.		MODELER:	
	CALM WINDS: **10.44%**	TOTAL COUNT:	
	AVG. WIND SPEED: **7.05 Knots**	DATE:	PROJECT NO.:

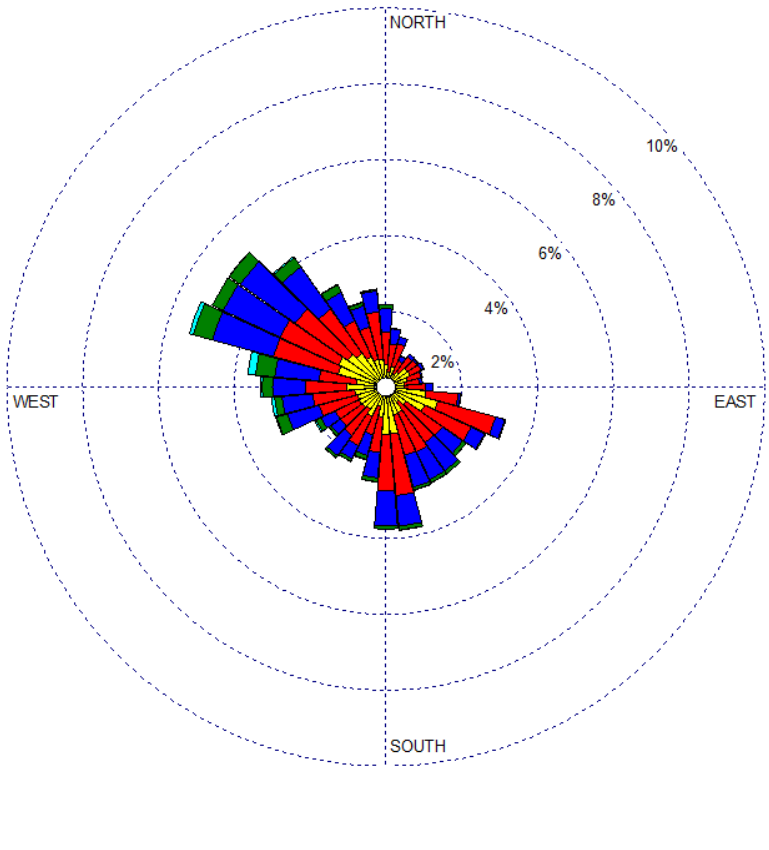
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

St. Louis, Mo 2015-2019 Winter (Dec.-Jan.-Feb.) Wind Rose

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
Official St. Louis International Airport (KSTL) Observations.		MODELER:	
	CALM WINDS: **7.27%**	TOTAL COUNT:	
	AVG. WIND SPEED: **8.21 Knots**	DATE:	PROJECT NO.:

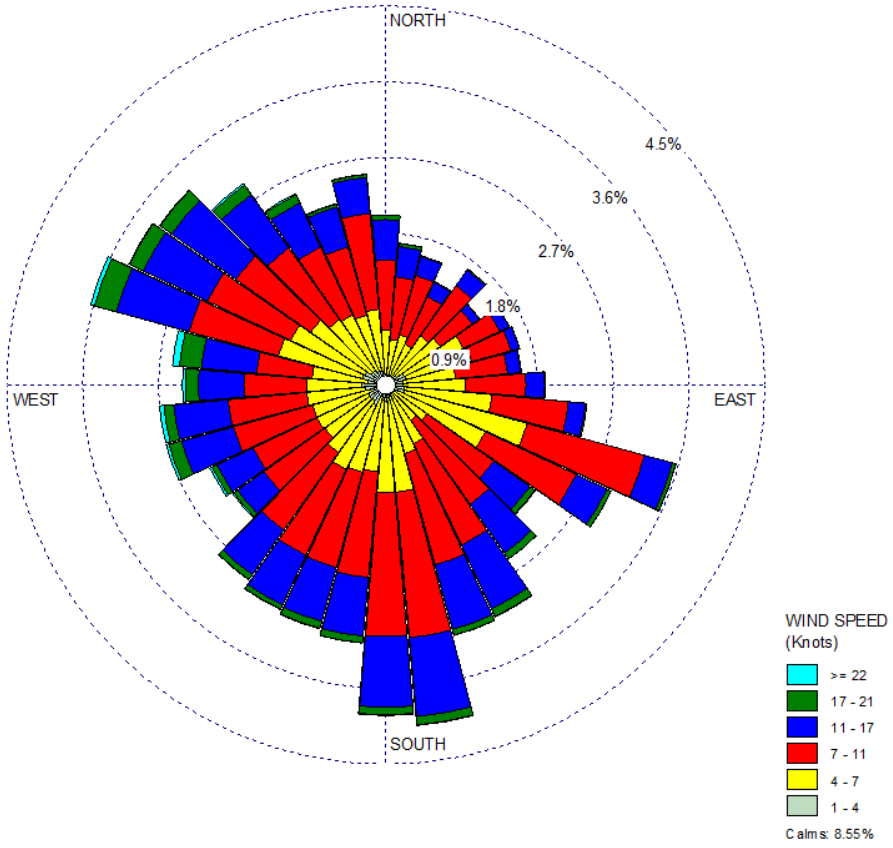
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

St. Louis, Mo 2015-2019 Annual Wind Rose

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS: Official St. Louis International Airport (KSTL) Observations.	DATA PERIOD:	COMPANY NAME:	
		MODELER:	
	CALM WINDS: **8.55%**	TOTAL COUNT:	
	AVG. WIND SPEED: **7.49 Knots**	DATE:	PROJECT NO.:

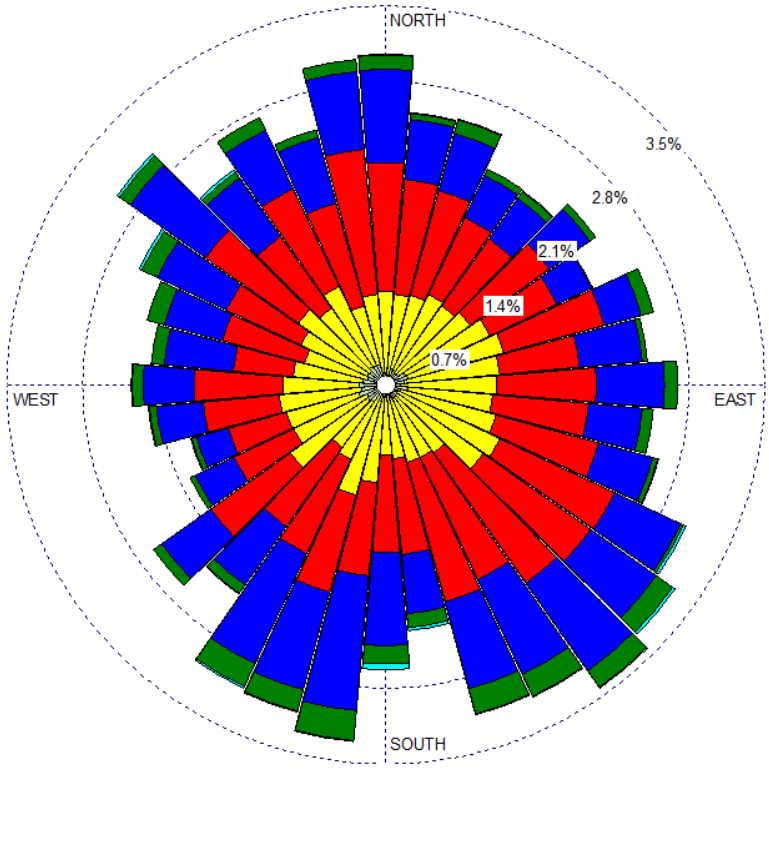
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Kirksville, Mo (Outstate) 2015-2019 Spring (Mar. - Apr. - May) Wind Rose

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS: Official Kirksville (KIRK) Airport Observations for Outstate.	DATA PERIOD:	COMPANY NAME:	
		MODELER:	
	CALM WINDS: **5.73%**	TOTAL COUNT:	
	AVG. WIND SPEED: **8.17 Knots**	DATE:	PROJECT NO.:

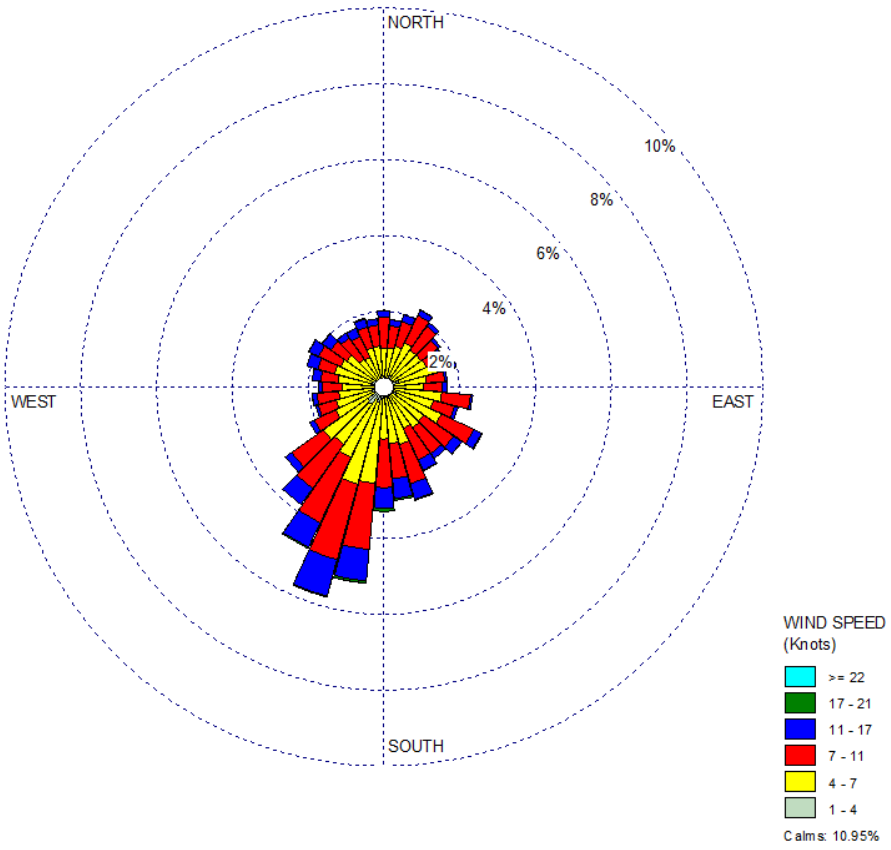
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Kirksville, Mo (Outstate) 2015-2019 Summer (June - July-Aug.) Wind Rose

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
Official Kirksville (KIRK) Airport Observations for Outstate.		MODELER:	
	CALM WINDS: **10.95%**	TOTAL COUNT:	
	AVG. WIND SPEED: **5.87 Knots**	DATE:	PROJECT NO.:

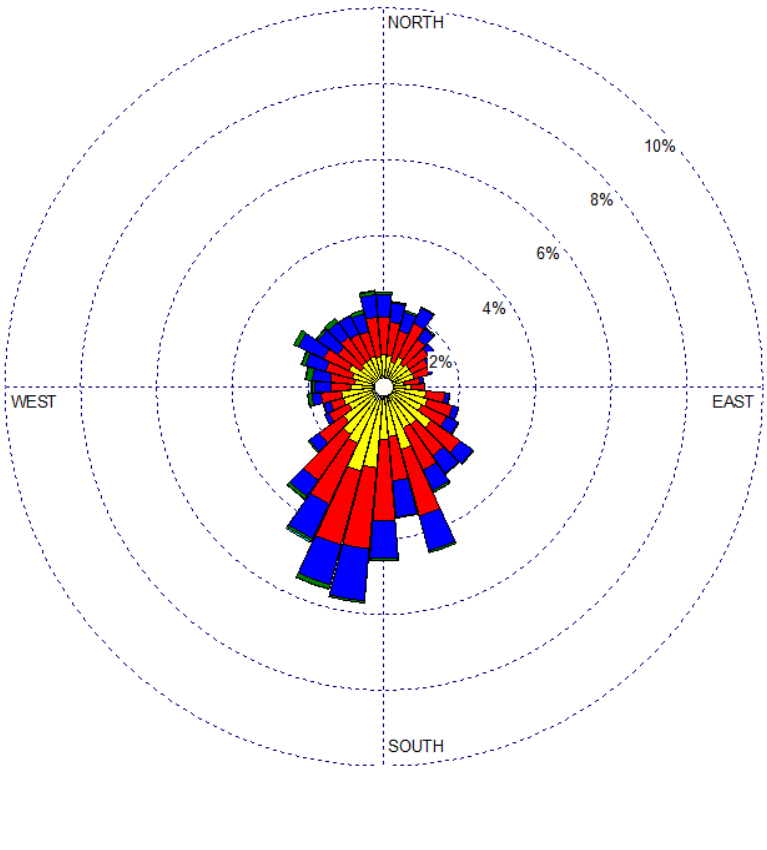
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Kirksville, Mo (Outstate) 2015-2019 Fall (Sept. - Oct. - Nov.) Wind Rose

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS: Official Kirksville (KIRK) Airport Observations for Outstate.	DATA PERIOD:	COMPANY NAME:	
		MODELER:	
	CALM WINDS: **7.64%**	TOTAL COUNT:	
	AVG. WIND SPEED: **7.18 Knots**	DATE:	PROJECT NO.:

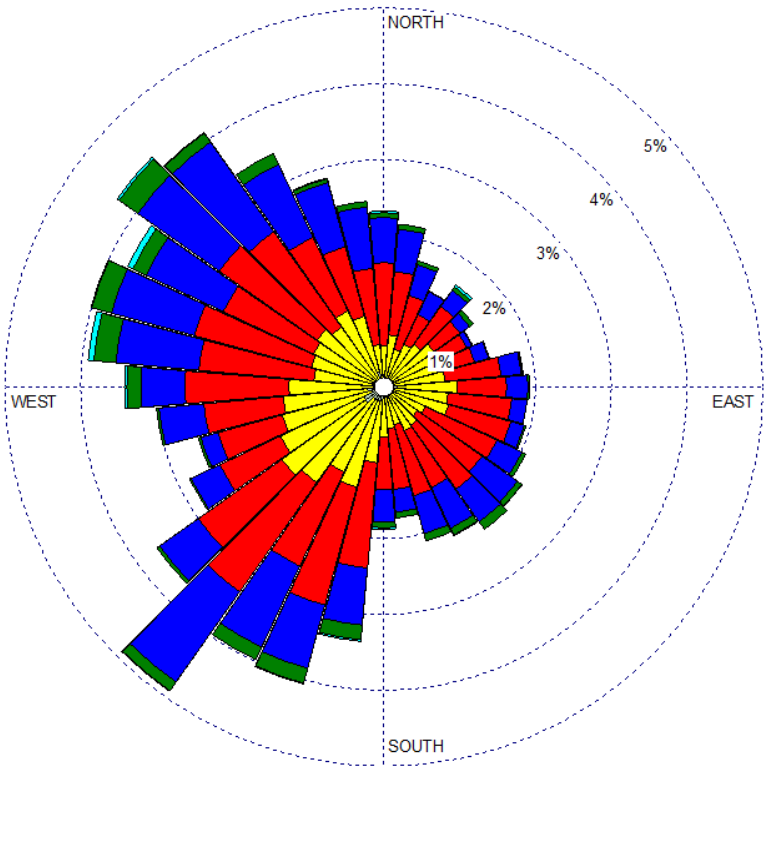
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Kirksville, Mo (Outstate) 2015-2019 Winter (Dec.-Jan-Feb.) Wind Rose

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
Official Kirksville (KIRK) Airport Observations for Outstate.		MODELER:	
	CALM WINDS: **4.06%**	TOTAL COUNT:	
	AVG. WIND SPEED: **8.20 Knots**	DATE:	PROJECT NO.:

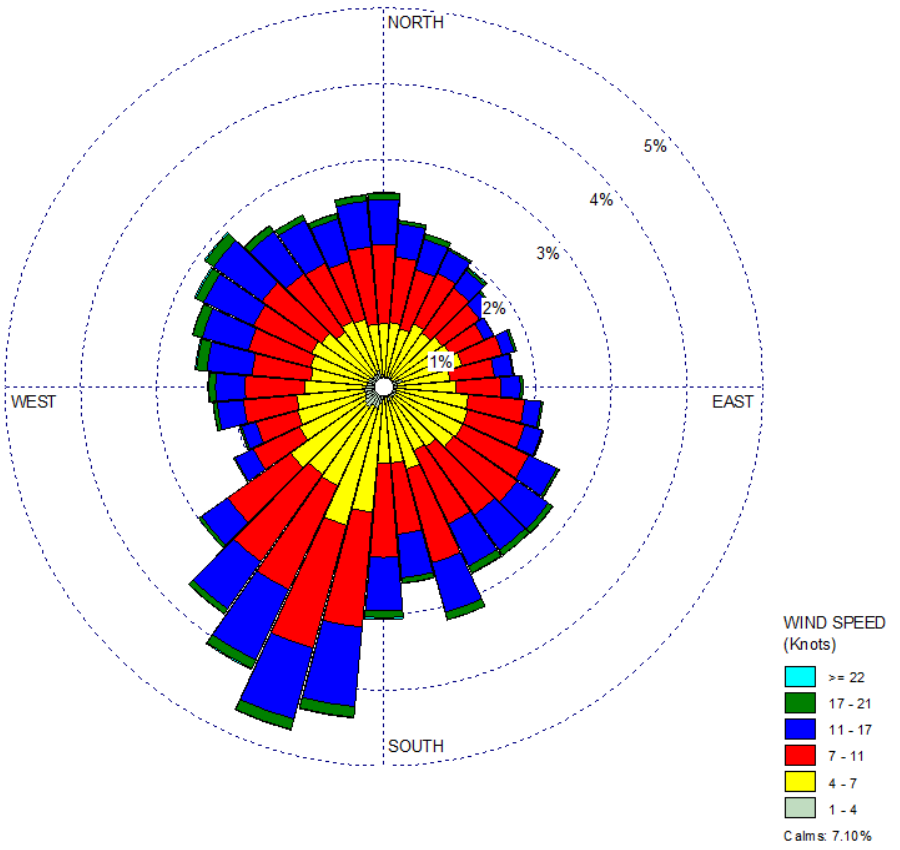
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Kirksville, Mo (Outstate) 2015-2019 Annual Wind Rose

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
Official Kirksville (KIRK) Airport Observations for Outstate.		MODELER:	
	CALM WINDS: **7.10%**	TOTAL COUNT:	
	AVG. WIND SPEED: **7.36 Knots**	DATE:	PROJECT NO.:

WRPLOT View - Lakes Environmental Software

Appendix B: EPA Region 7 Air Monitoring Network Assessment Guidance

5-YEAR AIR QUALITY SYSTEM ASSESSMENT
CFR REQUIREMENTS & REGIONAL RECOMMENDATIONS

The five year air quality surveillance system assessment is required to determine at a minimum:

1) If the network meets the monitoring objectives defined in Appendix D
2) Whether new monitoring sites are needed
3) Whether existing sites are no longer needed and can be terminated
4) Whether new technologies are appropriate for incorporation into the air monitoring network.
5) Whether the network sufficiently supports characterization of air quality in areas with large populations of susceptible individuals
6) Whether discontinuance of a monitoring site would have an adverse impact on other data users or health studies.
7) For PM2.5 the assessment must identify needed changes to population oriented sites

In order to assess the network's suitability for the seven objectives listed above the State agency will need to assess the following information.

1) Statewide and local level population statistics
2) Statewide ambient air monitoring network pollutant concentration measurement trends for the past 5-years
3) Statewide and local level emission source trends, characteristics, and inventory
4) Statewide plans to modify, add, or remove emission sources
5) Statewide and local level meteorological impacts on pollutant concentrations.
6) Potential impacts of precursor chemical emissions on pollutant concentrations
7) Potential impacts of pollutant and precursor transport on measured concentrations.
8) Atmospheric dispersion modeling output generated as part of a permit application or control strategy effectiveness demonstration.
9) Network suitability to measure the appropriate spatial scale of representativeness for selected pollutants.
10) Monitoring data spatial redundancy or gaps that need to be eliminated.
11) Programmatic trends or shifts in emphasis or funding that lead toward different data needs.

In order to generate the appropriate level of data necessary for this analysis the state agency should consider the following:

1) Statistical tools and methods
    a) Trend analysis of line charts and bar graphs of historical pollutant concentration trends in comparison with the NAAQS
    b) Correlation analysis to discern the similarity of measurements between individual monitoring stations on a single pollutant basis.
    c) Principal component analysis, if applicable for a given agency.

2) Graphical tools and methods
    a) Maps with multiple layers and overlays depicting:
        a.1) Monitor locations
        a.2) Emission inventory data
        a.3) Population data
        a.4) Affects of either adding or deleting a monitor from the network
        a.5) Spatial area served by a monitoring site for a given pollutant

Appendix C: Monitoring Network Table

Missouri Ambient Air Monitoring Network

MIC	*Microscale*	*Several meters up to about 100 meters*
MID	*Middle*	*100 meters to 0.5 kilometer*
NBR	*Neighborhood*	*0.5 to 4.0 kilometers range*
URB	*Urban*	*4 to 50 kilometers*
REG	*Regional*	*Tens to hundreds of kilometers*
COM	*National Ambient Air Quality Standards (NAAQS) Compliance*	
MET	*Meteorological Data*	
N/A	*Not Applicable*	
NCore	*National Multi-Pollutant Monitoring Stations*	
NON-A	*Non-Ambient Site*	
NON-R	*Non-Regulatory*	
PQAO	*Primary Quality Assurance Organization*	
RES	*Research*	
SLAMS	*State and Local Monitoring Stations*	
SIP	*State Implementation Plan*	
SPEC	*Speciation*	
STA	*State Standard*	
SPM	*Special Purpose Monitoring*	
SPP	*Special Purpose Project*	
Coll	*Collocated monitor. A secondary monitor at a site.*	

Ameren Missouri (PQAO - 1440)

Labadie "Plant" Site — *AQS Site Number* 29-071-9003

~1.5 km south of the Labadie Energy Center, Labadie, MO 63055

Latitude: 38.5486 ***AQCR:*** 070 Metropolitan St. Louis

Longitude: -90.83725 ***MSA:*** 7040 St. Louis, MO-IL

Elevation (ft): 680

Parameter	*AQS Code*	*AQS Monitor Type*	*AQS POC*	*Coll*	*AQS Freq*	*AQS Scale*	*State-Obj*	*AQS Unit-Code*	*AQS Unit*	*AQS Method Code*	*AQS Method*	*AQS Monitor Objective*
Std Dev Hz Wind Direction	61106	Industrial	1	☐	1	N/A	MET	014	deg	127	Scintec MFAS Sodar/RASS Acoustic Sounder	Other (40m - 300m)
Temperature Virtual	62102	Industrial	1	☐	1	N/A	MET	017	deg C	128	Scintec MFAS Sodar/RASS Radar Profiler	Other (40m - 300m)
Wind Direction - Resultant	61104	Industrial	1	☐	1	N/A	MET	014	deg	127	Scintec MFAS Sodar/RASS Acoustic Sounder	Other (40m - 300m)
Wind Speed - Resultant	61103	Industrial	1	☐	1	N/A	MET	011	m/s	127	Scintec MFAS Sodar/RASS Acoustic Sounder	Other (40m - 300m)
WS - Sigma Theta (Vertical)	61110	Industrial	1	☐	1	N/A	MET	011	m/s	127	Scintec MFAS Sodar/RASS Acoustic Sounder	Other (40m - 300m)

Labadie, North

AQS Site Number 29-183-9004

~150 ft. north of Terry Rd and ~200 ft. Kingfisher Ct, Augusta, MO 63332

Latitude: 38.59557 ***AQCR:*** 070 Metropolitan St. Louis

Longitude: -90.82864 ***MSA:*** 7040 St. Louis, MO-IL

Elevation (ft): 816

Parameter	AQS Code	AQS Monitor Type	AQS POC	Coll	AQS Freq	AQS Scale	State-Obj	AQS Unit-Code	AQS Unit	AQS Method Code	AQS Method	AQS Monitor Objective
Sulfur Dioxide	42401	Industrial	1	☐	H	MID	COM	008	ppb	100	Ultra-violet Fluorescence	Source Oriented
Sulfur Dioxide Max 5-min Avg	42406	Industrial	1	☐	1	MID	COM	008	ppb	100	Ultra-violet Fluorescence	Source Oriented

Labadie, Northwest

AQS Site Number 29-183-9002

Rt. 94, Augusta, MO 63332 near the intersection with Schluersburg Road

Latitude: 38.5818 ***AQCR:*** 070 Metropolitan St. Louis

Longitude: -90.865528 ***MSA:*** 7040 St. Louis, MO-IL

Elevation (ft): 550

Parameter	AQS Code	AQS Monitor Type	AQS POC	Coll	AQS Freq	AQS Scale	State-Obj	AQS Unit-Code	AQS Unit	AQS Method Code	AQS Method	AQS Monitor Objective
Outdoor Temperature	62101	Industrial	2	☐	1	N/A	MET	017	deg C	040	Electronic Averaging	Other (10m Probe Height)
Outdoor Temperature	62101	Industrial	3	☐	1	N/A	MET	017	deg C	040	Electronic Averaging	Other (2m Probe Height)
Outdoor Temperature Diff	62106	Industrial	1	☐	1	N/A	MET	116	Temp Diff deg C	041	Instrumental: Elect or Mach Avg Lev 2-Lev1	Other (10m - 2m Probe Heights)

Relative Humidity	62201	Industrial	1	☐	1	N/A	MET	019	%humidity	061	Met One 083D	Other
Std Dev Hz Wind Direction	61106	Industrial	1	☐	1	N/A	MET	014	deg	063	Arithmetic Standard Deviation	Other (10m Tower)
Std Dev Vt Wind Direction	61107	Industrial	1	☐	1	N/A	MET	014	deg	020	Arithmetic Standard Deviation	Other (10m Tower)
Sulfur Dioxide	42401	Industrial	1	☐	H	MID	COM	008	ppb	100	Ultra-violet Fluorescence	Source Oriented
Sulfur Dioxide Max 5-min Avg	42406	Industrial	1	☐	1	MID	COM	008	ppb	100	Ultra-violet Fluorescence	Source Oriented
Wind Direction - Resultant	61104	Industrial	1	☐	1	N/A	MET	014	deg	020	Vector Summation	Other (10m Tower)
Wind Direction - Scalar	61102	Industrial	1	☐	1	N/A	MET	014	deg	063	Climatronics	Other (10m Tower)
Wind Speed - Resultant	61103	Industrial	1	☐	1	N/A	MET	011	m/s	020	Vector Summation	Other (10m Tower)
Wind Speed - Scalar	61101	Industrial	1	☐	1	N/A	MET	011	m/s	063	Climatronics	Other (10m Tower)

Wind Speed - Vertical	61109	Industrial	1	☐	1	N/A	MET	011	m/s	020	Electronic Averaging	Other (10m Tower)
WS - Sigma Theta (Vertical)	61110	Industrial	1	☐	1	N/A	MET	011	m/s	020	Arithmetic Standard Deviation	Other (10m Tower)

Labadie, Southwest — *AQS Site Number* 29-071-9002

870 Albertina Lane, Labadie, MO 63055

Latitude: 38.52825 ***AQCR:*** 070 Metropolitan St. Louis

Longitude: -90.86301 ***MSA:*** 7040 St. Louis, MO-IL

Elevation (ft): 630

Parameter	*AQS Code*	*AQS Monitor Type*	*AQS POC*	*Coll*	*AQS Freq*	*AQS Scale*	*State-Obj*	*AQS Unit-Code*	*AQS Unit*	*AQS Method Code*	*AQS Method*	*AQS Monitor Objective*
Sulfur Dioxide	42401	Industrial	1	☐	H	MID	COM	008	ppb	100	Ultra-violet Fluorescence	Source Oriented
Sulfur Dioxide Max 5-min Avg	42406	Industrial	1	☐	1	MID	COM	008	ppb	100	Ultra-violet Fluorescence	Source Oriented

Labadie, Valley Site — *AQS Site Number* 29-071-9001

2901 Labadie Bottom Road, Labadie, MO 63055

Latitude: 38.572522 ***AQCR:*** 070 Metropolitan St. Louis

Longitude: -90.796911 ***MSA:*** 7040 St. Louis, MO-IL

Elevation (ft): 525

Parameter	*AQS Code*	*AQS Monitor Type*	*AQS POC*	*Coll*	*AQS Freq*	*AQS Scale*	*State-Obj*	*AQS Unit-Code*	*AQS Unit*	*AQS Method Code*	*AQS Method*	*AQS Monitor Objective*
Barometric Pressure	64101	Industrial	1	☐	1	N/A	MET	016	Millbars	015	Instrumental-Barometric Press Transducer	Other

Outdoor Temperature	62101	Industrial	2	☐	1	N/A	MET	017	deg C	040	Electronic Averaging	Other (10m Probe Height)
Outdoor Temperature	62101	Industrial	3	☐	1	N/A	MET	017	deg C	040	Electronic Averaging	Other (2m Probe Height)
Outdoor Temperature Diff	62106	Industrial	1	☐	1	N/A	MET	116	Temp Diff deg C	041	Instrumental: Elect or Mach Avg Lev 2-Lev1	Other (10m - 2m Probe Heights)
Precipitation	65102	Industrial	1	☐	1	N/A	MET	021	inches	014	Heated Tipping Bucket	Other
Relative Humidity	62201	Industrial	1	☐	1	N/A	MET	019	%humidity	061	Met One 083D	Other
Solar Radiation	63301	Industrial	1	☐	1	N/A	MET	079	W/m^2	011	Instrumental-Pyranometer	Other
Std Dev Hz Wind Direction	61106	Industrial	1	☐	1	N/A	MET	014	deg	063	Arithmetic Standard Deviation	Other (10m Tower)
Std Dev Vt Wind Direction	61107	Industrial	1	☐	1	N/A	MET	014	deg	020	Arithmetic Standard Deviation	Other (10m Tower)
Sulfur Dioxide	42401	Industrial	1	☐	H	MID	COM	008	ppb	100	Ultra-violet Fluorescence	Source Oriented

Sulfur Dioxide Max 5-min Avg	42406	Industrial	1	☐	1	MID	COM	008	ppb	100	Ultra-violet Fluorescence	Source Oriented
Wind Direction - Resultant	61104	Industrial	1	☐	1	N/A	MET	014	deg	020	Vector Summation	Other (10m Tower)
Wind Direction - Scalar	61102	Industrial	1	☐	1	N/A	MET	014	deg	063	Climatronics	Other (10m Tower)
Wind Speed - Resultant	61103	Industrial	1	☐	1	N/A	MET	011	m/s	020	Vector Summation	Other (10m Tower)
Wind Speed - Scalar	61101	Industrial	1	☐	1	N/A	MET	011	m/s	063	Climatronics	Other (10m Tower)
Wind Speed - Vertical	61109	Industrial	1	☐	1	N/A	MET	011	m/s	020	Electronic Averaging	Other (10m Tower)
WS - Sigma Theta (Vertical)	61110	Industrial	1	☐	1	N/A	MET	011	m/s	020	Arithmetic Standard Deviation	Other (10m Tower)

Rush Island, Fults-Site, IL — *AQS Site Number* 17-133-9001

Off Ivy Road, Fults, IL 62244

Latitude: 38.15908 ***AQCR:*** 138 SE Missouri

Longitude: -90.22728 ***MSA:*** 0000 Not in a MSA

Elevation (ft): 446

Parameter	*AQS Code*	*AQS Monitor Type*	*AQS POC*	*Coll*	*AQS Freq*	*AQS Scale*	*State-Obj*	*AQS Unit-Code*	*AQS Unit*	*AQS Method Code*	*AQS Method*	*AQS Monitor Objective*

Barometric Pressure	64101	Industrial	1	☐	1	N/A	MET	016	Millbars	015	Instrumental-Barometric Press Transducer	Other
Outdoor Temperature	62101	Industrial	2	☐	1	N/A	MET	017	deg C	040	Electronic Averaging	Other (10m Probe Height)
Outdoor Temperature	62101	Industrial	3	☐	1	N/A	MET	017	deg C	040	Electronic Averaging	Other (2m Probe Height)
Outdoor Temperature Diff	62106	Industrial	1	☐	1	N/A	MET	116	Temp Diff deg C	041	Instrumental: Elect or Mach Avg Lev 2-Lev1	Other (10m - 2m Probe Heights)
Precipitation	65102	Industrial	1	☐	1	N/A	MET	021	inches	014	Heated Tipping Bucket	Other
Relative Humidity	62201	Industrial	1	☐	1	N/A	MET	019	%humidity	061	Met One 083D	Other
Solar Radiation	63301	Industrial	1	☐	1	N/A	MET	079	W/m^2	011	Instrumental-Pyranometer	Other
Std Dev Hz Wind Direction	61106	Industrial	1	☐	1	N/A	MET	014	deg	063	Arithmetic Standard Deviation	Other (10m Tower)
Std Dev Vt Wind Direction	61107	Industrial	1	☐	1	N/A	MET	014	deg	020	Arithmetic Standard Deviation	Other (10m Tower)

Sulfur Dioxide	42401	Industrial	1	☐	H	MID	COM	008	ppb	100	Ultra-violet Fluorescence	Source Oriented
Sulfur Dioxide Max 5-min Avg	42406	Industrial	1	☐	1	MID	COM	008	ppb	100	Ultra-violet Fluorescence	Source Oriented
Wind Direction - Resultant	61104	Industrial	1	☐	1	N/A	MET	014	deg	020	Vector Summation	Other (10m Tower)
Wind Direction - Scalar	61102	Industrial	1	☐	1	N/A	MET	014	deg	063	Climatronics	Other (10m Tower)
Wind Speed - Resultant	61103	Industrial	1	☐	1	N/A	MET	011	m/s	020	Vector Summation	Other (10m Tower)
Wind Speed - Scalar	61101	Industrial	1	☐	1	N/A	MET	011	m/s	063	Climatronics	Other (10m Tower)
Wind Speed - Vertical	61109	Industrial	1	☐	1	N/A	MET	011	m/s	020	Electronic Averaging	Other (10m Tower)
WS - Sigma Theta (Vertical)	61110	Industrial	1	☐	1	N/A	MET	011	m/s	020	Arithmetic Standard Deviation	Other (10m Tower)

Rush Island, Johnson Tall Tower — AQS Site Number 29-099-9008

600 Johnson Rd., Festus, MO 63028

Latitude: 38.11999 ***AQCR:*** 070 Metropolitan St. Louis

Longitude: -90.28214 ***MSA:*** 7040 St. Louis, MO-IL

Elevation (ft): 656

Parameter	*AQS Code*	*AQS Monitor Type*	*AQS POC*	*Coll*	*AQS Freq*	*AQS Scale*	*State-Obj*	*AQS Unit-Code*	*AQS Unit*	*AQS Method Code*	*AQS Method*	*AQS Monitor Objective*
Outdoor Temperature	62101	Industrial	2	☐	1	N/A	MET	017	deg C	040	Electronic Averaging	Other (62.5m Probe Height)
Outdoor Temperature	62101	Industrial	3	☐	1	N/A	MET	017	deg C	040	Electronic Averaging	Other (132.5m Probe Height)
Outdoor Temperature Diff	62106	Industrial	1	☐	1	N/A	MET	116	Temp Diff deg C	041	Instrumental: Elect or Mach Avg Lev 2-Lev1	Other (132.5m-62.5m Probe Heights)
Std Dev Hz Wind Direction	61106	Industrial	1	☐	1	N/A	MET	014	deg	063	Arithmetic Standard Deviation	Other (132.5m, 15 min)
Std Dev Hz Wind Direction	61106	Industrial	2	☐	1	N/A	MET	014	deg	063	Arithmetic Standard Deviation	Other (132.5m, 60 min)
Std Dev Hz Wind Direction	61106	Industrial	3	☐	1	N/A	MET	014	deg	063	Arithmetic Standard Deviation	Other (62.5m, A-15 min)
Std Dev Hz Wind Direction	61106	Industrial	4	☐	1	N/A	MET	014	deg	063	Arithmetic Standard Deviation	Other (62.5m, A-60 min)
Std Dev Hz Wind Direction	61106	Industrial	5	☐	1	N/A	MET	014	deg	063	Arithmetic Standard Deviation	Other (62.5m, B-15 min)

Std Dev Hz Wind Direction	61106	Industrial	6	☐	1	N/A	MET	014	deg	063	Arithmetic Standard Deviation	Other (62.5m, B-60 min)
Std Dev Vt Wind Direction	61107	Industrial	1	☐	1	N/A	MET	014	deg	020	Arithmetic Standard Deviation	Other (132.5m, 15 min)
Std Dev Vt Wind Direction	61107	Industrial	2	☐	1	N/A	MET	014	deg	020	Arithmetic Standard Deviation	Other (132.5m, 60min)
Std Dev Vt Wind Direction	61107	Industrial	3	☐	1	N/A	MET	014	deg	020	Arithmetic Standard Deviation	Other (62.5m, A-15 min)
Std Dev Vt Wind Direction	61107	Industrial	4	☐	1	N/A	MET	014	deg	020	Arithmetic Standard Deviation	Other (62.5m, A-60min)
Std Dev Vt Wind Direction	61107	Industrial	5	☐	1	N/A	MET	014	deg	020	Arithmetic Standard Deviation	Other (62.5m, B-15 min)
Std Dev Vt Wind Direction	61107	Industrial	6	☐	1	N/A	MET	014	deg	020	Arithmetic Standard Deviation	Other (62.5m, B-60 min)
Wind Direction - Resultant	61104	Industrial	1	☐	1	N/A	MET	014	deg	020	Vector Summation	Other (132.5m Probe Height)
Wind Direction - Resultant	61104	Industrial	2	☐	1	N/A	MET	014	deg	020	Vector Summation	Other (62.5m Probe Height)
Wind Direction - Resultant	61104	Industrial	3	☐	1	N/A	MET	014	deg	020	Vector Summation	Other (62.5m Probe Height)

Wind Direction - Scalar	61102	Industrial	1	☐	1	N/A	MET	014	deg	063	Climatronics	Other (132.5m Probe Height)
Wind Direction - Scalar	61102	Industrial	2	☐	1	N/A	MET	014	deg	063	Climatronics	Other (62.5m Probe Height)
Wind Direction - Scalar	61102	Industrial	3	☐	1	N/A	MET	014	deg	063	Climatronics	Other (62.5m Probe Height)
Wind Speed - Resultant	61103	Industrial	1	☐	1	N/A	MET	011	m/s	020	Vector Summation	Other (132.5m Probe Height)
Wind Speed - Resultant	61103	Industrial	2	☐	1	N/A	MET	011	m/s	020	Vector Summation	Other (62.5m Probe Height)
Wind Speed - Resultant	61103	Industrial	3	☐	1	N/A	MET	011	m/s	020	Vector Summation	Other (62.5m Probe Height)
Wind Speed - Scalar	61101	Industrial	1	☐	1	N/A	MET	011	m/s	063	Climatronics	Other (132.5m Probe Height)
Wind Speed - Scalar	61101	Industrial	2	☐	1	N/A	MET	011	m/s	063	Climatronics	Other (62.5m Probe Height)
Wind Speed - Scalar	61101	Industrial	3	☐	1	N/A	MET	011	m/s	063	Climatronics	Other (62.5m Probe Height)
Wind Speed - Vertical	61109	Industrial	1	☐	1	N/A	MET	011	m/s	020	Electronic Averaging	Other (132.5m Probe Height)

Wind Speed - Vertical	61109	Industrial	2	☐	1	N/A	MET	011	m/s	020	Electronic Averaging	Other (62.5m Probe Height)
Wind Speed - Vertical	61109	Industrial	3	☐	1	N/A	MET	011	m/s	020	Electronic Averaging	Other (62.5m Probe Height)
WS - Sigma Theta (Vertical)	61110	Industrial	1	☐	1	N/A	MET	011	m/s	020	Arithmetic Standard Deviation	Other (132.5m Probe Height)
WS - Sigma Theta (Vertical)	61110	Industrial	2	☐	1	N/A	MET	011	m/s	020	Arithmetic Standard Deviation	Other (62.5m Probe Height)
WS - Sigma Theta (Vertical)	61110	Industrial	3	☐	1	N/A	MET	011	m/s	020	Arithmetic Standard Deviation	Other (62.5m Probe Height)

Rush Island, Natchez — *AQS Site Number* 29-099-9009

917 Natchez Trace Drive, Bloomsdale, MO 63627

Latitude: 38.10525 ***AQCR:*** 070 Metropolitan St. Louis

Longitude: -90.29842 ***MSA:*** 7040 St. Louis, MO-IL

Elevation (ft): 505

Parameter	*AQS Code*	*AQS Monitor Type*	*AQS POC*	*Coll*	*AQS Freq*	*AQS Scale*	*State-Obj*	*AQS Unit-Code*	*AQS Unit*	*AQS Method Code*	*AQS Method*	*AQS Monitor Objective*
Sulfur Dioxide	42401	Industrial	1	☐	H	MID	COM	008	ppb	100	Ultra-violet Fluorescence	Source Oriented
Sulfur Dioxide Max 5-min Avg	42406	Industrial	1	☐	1	MID	COM	008	ppb	100	Ultra-violet Fluorescence	Source Oriented

Rush Island, Weaver Road & Highway AA

AQS Site Number 29-099-9007

802 Weaver Road, Festus, MO 63028

Latitude:	38.144972	***AQCR:***	070	Metropolitan St. Louis
Longitude:	-90.304783	***MSA:***	7040	St. Louis, MO-IL
Elevation (ft):	502			

Parameter	*AQS Code*	*AQS Monitor Type*	*AQS POC*	*Coll*	*AQS Freq*	*AQS Scale*	*State-Obj*	*AQS Unit-Code*	*AQS Unit*	*AQS Method Code*	*AQS Method*	*AQS Monitor Objective*
Sulfur Dioxide	42401	Industrial	1	☐	H	MID	COM	008	ppb	100	Ultra-violet Fluorescence	Source Oriented
Sulfur Dioxide Max 5-min Avg	42406	Industrial	1	☐	1	MID	COM	008	ppb	100	Ultra-violet Fluorescence	Source Oriented

Doe Run Buick (PQAO - 1288) (Combining all Doe Run to 1290)

County Road 75 — *AQS Site Number* 29-093-9010

98 Iron County Road, Bixby, MO 65439

Latitude: 37.64876 ***AQCR:*** 138 SE Missouri

Longitude: -91.14980 ***MSA:*** 0000 Not in a MSA

Elevation (ft): 1365

Parameter	*AQS Code*	*AQS Monitor Type*	*AQS POC*	*Coll*	*AQS Freq*	*AQS Scale*	*State-Obj*	*AQS Unit-Code*	*AQS Unit*	*AQS Method Code*	*AQS Method*	*AQS Monitor Objective*
Sulfur Dioxide	42401	Industrial	1	☐	H	MID	COM	008	ppb	060	Pulsed Fluorescent	Source Oriented
Sulfur Dioxide Max 5-min Avg	42406	Industrial	1	☐	1	MID	COM	008	ppb	060	Pulsed Fluorescent	Source Oriented

Doe Run Buick - Buick NE — *AQS Site Number* 29-093-9008

346 Power Lane, Bixby West, MO 65439

Latitude: 37.65214 ***AQCR:*** 138 SE Missouri

Longitude: -91.11689 ***MSA:*** 0000 Not in a MSA

Elevation (ft): 1423

Parameter	*AQS Code*	*AQS Monitor Type*	*AQS POC*	*Coll*	*AQS Freq*	*AQS Scale*	*State-Obj*	*AQS Unit-Code*	*AQS Unit*	*AQS Method Code*	*AQS Method*	*AQS Monitor Objective*
Lead (TSP) - LC FRM/FEM	14129	Industrial	1	☐	1/1	MID	COM	105	ug/m^3-LC	192	Inductive Coupled Plasma Spectrometry	Source Oriented

Doe Run Buick - North #5 (NON-A) — *AQS Site Number* 29-093-0021

Doe Run Buick - North#5, Buick, MO 65439

Latitude: 37.65178 ***AQCR:*** 138 SE Missouri

Longitude: -91.13094 ***MSA:*** 0000 Not in a MSA

Elevation (ft): 1443

Parameter	*AQS Code*	*AQS Monitor Type*	*AQS POC*	*Coll*	*AQS Freq*	*AQS Scale*	*State-Obj*	*AQS Unit-Code*	*AQS Unit*	*AQS Method Code*	*AQS Method*	*AQS Monitor Objective*
Lead (TSP) - LC FRM/FEM	14129	Industrial	1	☐	1/6	MID	SIP	105	ug/m^3-LC	192	Inductive Coupled Plasma Spectrometry	Source Oriented

Doe Run Buick - South #1 (NON-A) — *AQS Site Number* 29-093-0016

Doe Run Buick - South#1, Buick, MO 65439

Latitude: 37.62400 ***AQCR:*** 138 SE Missouri

Longitude: -91.12827 ***MSA:*** 0000 Not in a MSA

Elevation (ft): 1502

Parameter	*AQS Code*	*AQS Monitor Type*	*AQS POC*	*Coll*	*AQS Freq*	*AQS Scale*	*State-Obj*	*AQS Unit-Code*	*AQS Unit*	*AQS Method Code*	*AQS Method*	*AQS Monitor Objective*
Lead (TSP) - LC FRM/FEM	14129	Industrial	1	☐	1/6	MID	SIP	105	ug/m^3-LC	192	Inductive Coupled Plasma Spectrometry	Source Oriented
Lead (TSP) - LC FRM/FEM	14129	Industrial	2	☑	1/6	MID	SIP	105	ug/m^3-LC	192	Inductive Coupled Plasma Spectrometry	Quality Assurance (Collocation)

Hwy 32 Northeast — *AQS Site Number* 29-093-9009

1582 Highway 32, Bixby, MO 65439

Latitude: 37.65319 ***AQCR:*** 138 SE Missouri

Longitude: -91.12795 ***MSA:*** 0000 Not in a MSA

Elevation (ft): 1384

Parameter	*AQS Code*	*AQS Monitor Type*	*AQS POC*	*Coll*	*AQS Freq*	*AQS Scale*	*State-Obj*	*AQS Unit-Code*	*AQS Unit*	*AQS Method Code*	*AQS Method*	*AQS Monitor Objective*

Sulfur Dioxide	42401	Industrial	1	☐	H	MID	COM	008	ppb	060	Pulsed Fluorescent	Source Oriented
Sulfur Dioxide Max 5-min Avg	42406	Industrial	1	☐	1	MID	COM	008	ppb	060	Pulsed Fluorescent	Source Oriented

West Entrance — *AQS Site Number* 29-093-9011

18594 Hwy KK, Boss, MO 65440

Latitude: 37.63211 ***AQCR:*** 138 SE Missouri

Longitude: -91.13565 ***MSA:*** 0000 Not in a MSA

Elevation (ft): 1463

Parameter	*AQS Code*	*AQS Monitor Type*	*AQS POC*	*Coll*	*AQS Freq*	*AQS Scale*	*State-Obj*	*AQS Unit-Code*	*AQS Unit*	*AQS Method Code*	*AQS Method*	*AQS Monitor Objective*
Sulfur Dioxide	42401	Industrial	1	☐	H	MID	COM	008	ppb	060	Pulsed Fluorescent	Source Oriented
Sulfur Dioxide Max 5-min Avg	42406	Industrial	1	☐	1	MID	COM	008	ppb	060	Pulsed Fluorescent	Source Oriented

Doe Run Glover (PQAO - 1289) (Combining all Doe Run to 1290)

Doe Run Glover - Big Creek #5 (NON-A)

***AQS Site Number*29-093-0029**

Doe Run Glover - Big Creek #5, Hwy 49 Glover, MO 65439

Latitude: 37.47211 ***AQCR:*** 138 SE Missouri

Longitude: -90.68919 ***MSA:*** 0000 Not in a MSA

Elevation (ft): 836

Parameter	*AQS Code*	*AQS Monitor Type*	*AQS POC*	*Coll*	*AQS Freq*	*AQS Scale*	*State-Obj*	*AQS Unit-Code*	*AQS Unit*	*AQS Method Code*	*AQS Method*	*AQS Monitor Objective*
Lead (TSP) - LC FRM/FEM	14129	Industrial	1	☐	1/6	MID	SIP	105	ug/m^3-LC	192	Inductive Coupled Plasma Spectrometry	Source Oriented

Doe Run Glover - Post Office #2 (NON-A)

***AQS Site Number*29-093-0027**

Doe Run Glover - Post Office #2, Hwy 49 Glover, MO 65439

Latitude: 37.48532 ***AQCR:*** 138 SE Missouri

Longitude: -90.68991 ***MSA:*** 0000 Not in a MSA

Elevation (ft): 831

Parameter	*AQS Code*	*AQS Monitor Type*	*AQS POC*	*Coll*	*AQS Freq*	*AQS Scale*	*State-Obj*	*AQS Unit-Code*	*AQS Unit*	*AQS Method Code*	*AQS Method*	*AQS Monitor Objective*
Lead (TSP) - LC FRM/FEM	14129	Industrial	1	☐	1/6	MID	SIP	105	ug/m^3-LC	192	Inductive Coupled Plasma Spectrometry	Source Oriented
Lead (TSP) - LC FRM/FEM	14129	Industrial	2	☑	1/6	MID	SIP	105	ug/m^3-LC	192	Inductive Coupled Plasma Spectrometry	Quality Assurance (Collocation)

Doe Run Herculaneum (PQAO - 1290) (No Change)

Herculaneum, Church Street (NON-A) — *AQS Site Number* 29-099-0024

951 Church St., Herculaneum, MO 63048

Latitude: 38.258667 ***AQCR:*** 070 Metropolitan St. Louis

Longitude: -90.380889 ***MSA:*** 7040 St. Louis, MO-IL

Elevation (ft): 463

Parameter	*AQS Code*	*AQS Monitor Type*	*AQS POC*	*Coll*	*AQS Freq*	*AQS Scale*	*State-Obj*	*AQS Unit-Code*	*AQS Unit*	*AQS Method Code*	*AQS Method*	*AQS Monitor Objective*
Lead (TSP) - LC FRM/FEM	14129	Industrial	1	☐	1/6	NBR	COM	105	ug/m^3-LC	192	Inductive Coupled Plasma Spectrometry	Source Oriented

Herculaneum, City Hall (Mott Street) — *AQS Site Number* 29-099-0020

360 Short Street, Herculaneum, MO, 63048

Latitude: 38.263394 ***AQCR:*** 070 Metropolitan St. Louis

Longitude: -90.379667 ***MSA:*** 7040 St. Louis, MO-IL

Elevation (ft): 468

Parameter	*AQS Code*	*AQS Monitor Type*	*AQS POC*	*Coll*	*AQS Freq*	*AQS Scale*	*State-Obj*	*AQS Unit-Code*	*AQS Unit*	*AQS Method Code*	*AQS Method*	*AQS Monitor Objective*
Lead (TSP) - LC FRM/FEM	14129	Industrial	1	☐	1/1	MID	COM	105	ug/m^3-LC	192	Inductive Coupled Plasma Spectrometry	Source Oriented & Highest Concentration
Lead (TSP) - LC FRM/FEM	14129	Industrial	2	☑	1/3	MID	COM	105	ug/m^3-LC	192	Inductive Coupled Plasma Spectrometry	Quality Assurance (Collocation)

Herculaneum, Dunklin High School (Combined) — *AQS Site Number* 29-099-0005

1 Black Cat Dr., Herculaneum, MO, 63048

Latitude: 38.26703 ***AQCR:*** 070 Metropolitan St. Louis

Longitude: -90.37875 ***MSA:*** 7040 St. Louis, MO-IL

Elevation (ft): 445

Parameter	*AQS Code*	*AQS Monitor Type*	*AQS POC*	*Coll*	*AQS Freq*	*AQS Scale*	*State-Obj*	*AQS Unit-Code*	*AQS Unit*	*AQS Method Code*	*AQS Method*	*AQS Monitor Objective*
Lead (TSP) - LC FRM/FEM	14129	Industrial	2	☐	1/3	NBR	COM	105	ug/m^3-LC	192	Inductive Coupled Plasma Spectrometry	Source Oriented & Population Exposure

Herculaneum, North Cross — *AQS Site Number* 29-099-0023

North Cross, Herculaneum, MO 63048

Latitude: 38.26216 ***AQCR:*** 070 Metropolitan St. Louis

Longitude: -90.38126 ***MSA:*** 7040 St. Louis, MO-IL

Elevation (ft): 463

Parameter	*AQS Code*	*AQS Monitor Type*	*AQS POC*	*Coll*	*AQS Freq*	*AQS Scale*	*State-Obj*	*AQS Unit-Code*	*AQS Unit*	*AQS Method Code*	*AQS Method*	*AQS Monitor Objective*
Lead (TSP) - LC FRM/FEM	14129	Industrial	1	☐	1/3	NBR	COM	105	ug/m^3-LC	192	Inductive Coupled Plasma Spectrometry	Source Oriented & Population Exposure

Environmental Services Program (ESP) [PQAO - 0588]

Alba — *AQS Site Number* 29-097-0004

20400 Millwood Rd., Alba, MO 64830

Latitude: 37.2385 ***AQCR:*** 139 SW Missouri

Longitude: -94.42468 ***MSA:*** 3710 Joplin, MO

Elevation (ft): 965

Parameter	*AQS Code*	*AQS Monitor Type*	*AQS POC*	*Coll*	*AQS Freq*	*AQS Scale*	*State-Obj*	*AQS Unit-Code*	*AQS Unit*	*AQS Method Code*	*AQS Method*	*AQS Monitor Objective*
Indoor Temperature	62107	SPM	1	☐	1	N/A	MET	017	deg C	013	Electronic Averaging	Other
Ozone	44201	SLAMS	1	☐	1	NBR	COM	007	ppm	047	Ultraviolet Photometric	Max Ozone Concentration & Population Exposure
Ozone	44201	SLAMS	2	☑	1	NBR	COM	007	ppm	047	Ultraviolet Photometric	-

Arnold West — *AQS Site Number* 29-099-0019

1709 Lonedell Dr., Arnold, MO 63010

Latitude: 38.44862 ***AQCR:*** 070 Metropolitan St. Louis

Longitude: -90.3958 ***MSA:*** 7040 St. Louis, MO-IL

Elevation (ft): 639

Parameter	*AQS Code*	*AQS Monitor Type*	*AQS POC*	*Coll*	*AQS Freq*	*AQS Scale*	*State-Obj*	*AQS Unit-Code*	*AQS Unit*	*AQS Method Code*	*AQS Method*	*AQS Monitor Objective*
Ammonium Ion PM2.5 LC	88301	SLAMS	6	☐	1/6	NBR	RES	105	ug/m^3-LC	812	Met One SASS Nylon	Population Exposure (UC-Davis)

Barometric Pressure	64101	SPM	1	☐	1	N/A	MET	059	mm (Hg)	014	Instrumental-Barometric Sensor	Other
Indoor Temperature	62107	SPM	1	☐	1	N/A	MET	017	deg C	013	Electronic Averaging	Other
OP CSN_Rev Undj PM2.5 LC TOR	88378	SLAMS	6	☐	1/6	NBR	RES	105	ug/m^3-LC	842	URG 3000N w/Pall Quartz filter & Cyclone Inlet	Population Exposure (UC-Davis)
Outdoor Temperature	62101	SPM	1	☐	1	N/A	MET	017	deg C	040	Electronic Averaging	Other (4m Probe Height)
Ozone	44201	SLAMS	1	☐	1	NBR	COM	007	ppm	047	Ultraviolet Photometric	Population Exposure
Ozone	44201	SLAMS	2	☑	1	NBR	COM	007	ppm	047	Ultraviolet Photometric	-
PM10 - STP FRM/FEM	81102	SLAMS	3	☐	1	NBR	COM	001	ug/m^3	079	R&P SA246B TEOM	Population Exposure
PM2.5 - LC FRM/FEM	88101	SLAMS	4	☐	1	NBR	COM	105	ug/m^3-LC	181	PM2.5 VSCC FEM or Thermo Scientific 1405-F	Population Exposure
PM2.5 Volatile Channel	88503	SPM	4	☐	1	NBR	AQI	105	ug/m^3-LC	181	PM2.5 VSCC FEM or Thermo Scientific 1405-F	Population Exposure

Relative Humidity	62201	SPM	1	☐	1	N/A	MET	019	%humidity	020	Instrumental-Computed (Indirect)	Other
Wind Direction - Resultant	61104	SPM	1	☐	1	N/A	MET	014	deg	067	Instrumental: RM Young Model 05103	Other (10m Tower)
Wind Speed - Resultant	61103	SPM	1	☐	1	N/A	MET	012	mph	067	Instrumental: RM Young Model 05103	Other (10m Tower)

Blair Street (86101-2 & 81102-1 to be discontinued) *AQS Site Number* **29-510-0085**

3247 Blair Street, St. Louis, MO 63107

Latitude: 38.65638 ***AQCR:*** 070 Metropolitan St. Louis

Longitude: -90.19825 ***MSA:*** 7040 St. Louis, MO-IL

Elevation (ft): 492

Parameter	*AQS Code*	*AQS Monitor Type*	*AQS POC*	*Coll*	*AQS Freq*	*AQS Scale*	*State-Obj*	*AQS Unit-Code*	*AQS Unit*	*AQS Method Code*	*AQS Method*	*AQS Monitor Objective*
Ammonium Ion PM2.5 LC	88301	SPM	6	☐	1/3	NBR	RES	105	ug/m^3-LC	812	Met One SASS Nylon	Highest Concentration (UC-Davis)
Barometric Pressure	64101	SLAMS	1	☐	1	N/A	MET	059	mm (Hg)	014	Instrumental-Barometric Sensor	Other
Black Carbon PM2.5 LC	88313	SLAMS	1	☐	1	NBR	RES	105	ug/m^3-LC	894	Magee Scientific TAPI M633 Aethalometer	Population Exposure
Carbon Monoxide	42101	NCORE	1	☐	H	NBR	COM	007	ppm	554	Gas Filter Corr Thermo Electron 48i TLE	Population Exposure

Indoor Temperature	62107	SLAMS	1	☐	1	N/A	MET	017	deg C	013	Electronic Averaging	Other (Large Shelter)
Indoor Temperature	62107	SLAMS	2	☐	1	N/A	MET	017	deg C	013	Electronic Averaging	Other (Small Shelter)
Lead PM10 LC	85128	SPM	6	☐	1/6	NBR	RES	108	ng/m^3-LC	907	R&P Partisol 2025 Teflon	Population Exposure (ERG)
Lead PM10 LC	85128	SPM	7	☑	1/6	NBR	RES	108	ng/m^3-LC	907	R&P Partisol 2025 Teflon	Population Exposure (ERG)
Nitric Oxide	42601	NCORE	1	☐	H	NBR	COM	008	ppb	699	Teledyne API 200 EU/501	Population Exposure
Nitric Oxide	42601	SLAMS	2	☐	H	NBR	COM	008	ppb	200	Teledyne API T200UP Photolytic	Population Exposure
Nitrogen Dioxide	42602	SLAMS	2	☐	H	NBR	COM	008	ppb	200	Teledyne API T200UP Photolytic	Population Exposure
OP CSN_Rev Undj PM2.5 LC TOR	88378	SPM	6	☐	1/3	NBR	RES	105	ug/m^3-LC	842	URG 3000N w/Pall Quartz filter & Cyclone Inlet	Highest Concentration (UC-Davis)
Outdoor Temperature	62101	NCORE	1	☐	1	N/A	MET	017	deg C	040	Electronic Averaging	Other (4m Probe Height)
Oxides of Nitrogen	42603	SLAMS	2	☐	H	NBR	COM	008	ppb	200	Teledyne API T200UP Photolytic	Population Exposure

Ozone	44201	NCORE	1	☐	1	NBR	COM	007	ppm	047	Ultraviolet Photometric	Population Exposure
Ozone	44201	NCORE	2	☑	1	NBR	COM	007	ppm	047	Ultraviolet Photometric	-
PM10 - LC/FEM/NonFEM	85101	SLAMS	1	☐	1/3	NBR	COM	105	ug/m^3-LC	127	Lo-Vol R&P 2025 Sequential	Population Exposure
PM10 - LC/FEM/NonFEM	85101	SLAMS	5	☐	1	NBR	COM	105	ug/m^3-LC	790	FDMS-Gravimetric 1405-DF	Population Exposure
PM10 - LC/FEM/NonFEM	85101	SPM	6	☐	H	NBR	COM	105	ug/m^3-LC	239	Teledyne API T640x	Population Exposure
PM10 - LC/FEM/NonFEM	85101	SPM	7	☑	H	NBR	COM	105	ug/m^3-LC	239	Teledyne API T640x	Population Exposure
PM10 - STP FRM/FEM	81102	SLAMS	1	☐	1/3	NBR	COM	001	ug/m^3	127	Lo-Vol R&P 2025 Sequential	Population Exposure
PM10 - STP FRM/FEM	81102	SPM	6	☐	H	NBR	COM	001	ug/m^3	239	Teledyne API T640x	Population Exposure
PM10 - STP FRM/FEM	81102	SPM	7	☑	H	NBR	COM	001	ug/m^3	239	Teledyne API T640x	Population Exposure
PM2.5 - LC FRM/FEM	88101	NCORE	2	☐	1/3	NBR	COM	105	ug/m^3-LC	145	R&P 2025 Sequential w/VSCC	Quality Assurance (Collocation)

PM2.5 - LC FRM/FEM	88101	SLAMS	4	☐	1	NBR	COM	105	ug/m^3-LC	182	FMDS-Gravimetric 1405-DF	Population Exposure
PM2.5 - LC FRM/FEM	88101	SPM	6	☐	H	NBR	COM	105	ug/m^3-LC	238	Teledyne API T640x	Population Exposure
PM2.5 - LC FRM/FEM	88101	SPM	7	☑	H	NBR	COM	105	ug/m^3-LC	238	Teledyne API T640x	Population Exposure
PM2.5 Tot Atmospheric	88500	SLAMS	1	☐	1	NBR	AQI	105	ug/m^3-LC	790	FDMS-Gravimetric 1405-DF	Population Exposure
PM2.5 Volatile Channel	88503	SLAMS	1	☐	1	NBR	AQI	105	ug/m^3-LC	790	FDMS-Gravimetric 1405-DF	Population Exposure
PMCoarse - LC FRM/FEM	86101	SLAMS	2	☐	1/3	NBR	COM	105	ug/m^3-LC	176	Thermo 2025 Sequential PM10-PM2.5	Population Exposure
PMCoarse - LC FRM/FEM	86101	SPM	6	☐	H	NBR	COM	105	ug/m^3-LC	240	Teledyne API T640x	Population Exposure
PMCoarse - LC FRM/FEM	86101	SPM	7	☑	H	NBR	COM	105	ug/m^3-LC	240	Teledyne API T640x	Population Exposure
PMCoarse - LC FRM/FEM	86101	SLAMS	8	☐	1	NBR	COM	105	ug/m^3-LC	207	FMDS-Gravimetric 1405-DF	Population Exposure
Reactive Oxides of N (NOY)	42600	NCORE	1	☐	H	NBR	COM	008	ppb	699	Teledyne API 200 EU/501	Population Exposure

Relative Humidity	62201	NCORE	1	☐	1	N/A	MET	019	%humidity	014	Instrumental-Hygromer C94 Probe	Other
Solar Radiation	63301	SLAMS	1	☐	1	N/A	MET	079	W/m^2	011	Instrumental-Pyranometer	Other
Std Dev Hz Wind Direction	61106	SPM	1	☐	1	N/A	MET	014	deg	020	Arithmetic Standard Deviation	Other (10m Tower)
Sulfur Dioxide	42401	NCORE	1	☐	H	NBR	COM	008	ppb	560	Pulsed Flourescent 43i-TLE	Population Exposure
Sulfur Dioxide Max 5-min Avg	42406	NCORE	1	☐	1	NBR	COM	008	ppb	560	Pulsed Fluorescent	Population Exposure
UV Carbon PM2.5 LC	88314	SLAMS	1	☐	1	NBR	RES	105	ug/m^3-LC	894	Magee Scientific TAPI M633 Aethalometer	Population Exposure
Wind Direction - Resultant	61104	NCORE	1	☐	1	N/A	MET	014	deg	065	Instrumental: RM Young Model 05305	Other (10m Tower)
Wind Speed - Resultant	61103	NCORE	1	☐	1	N/A	MET	012	mph	065	Instrumental: RM Young Model 05305	Other (10m Tower)

Blue Ridge, I-70

AQS Site Number 29-095-0042

4018 Harvard Lane, Kansas City, MO 64133

Latitude: 39.047911 ***AQCR:*** 094 Metropolitan Kansas City

Longitude: -94.450513 ***MSA:*** 3760 Kansas City, MO-KS

Elevation (ft): 960

Parameter	AQS Code	AQS Monitor Type	AQS POC	Coll	AQS Freq	AQS Scale	State-Obj	AQS Unit-Code	AQS Unit	AQS Method Code	AQS Method	AQS Monitor Objective
Barometric Pressure	64101	SPM	1	☐	1	N/A	MET	059	mm (Hg)	014	Instrumental-Barometric Sensor	Other
Black Carbon PM2.5 LC	88313	SPM	1	☐	1	MIC	COM	105	ug/m^3-LC	894	Magee Scientific TAPI M633 Aethalometer	Source Oriented
Carbon Monoxide	42101	SLAMS	1	☐	H	MIC	COM	007	ppm	554	Gas Filter Corr Thermo Electron 48i TLE	Source Oriented
Indoor Temperature	62107	SPM	1	☐	1	N/A	MET	017	deg C	013	Electronic Averaging	Other
Nitric Oxide	42601	SPM	1	☐	H	MIC	COM	008	ppb	074	Chemiluminescence	Source Oriented
Nitrogen Dioxide	42602	SLAMS	1	☐	H	MIC	COM	008	ppb	074	Chemiluminescence	Source Oriented
Outdoor Temperature	62101	SPM	1	☐	1	N/A	MET	017	deg C	040	Electronic Averaging	Other (4m Probe Height)

Outdoor Temperature	62101	SPM	2	☐	1	N/A	MET	017	deg C	040	Electronic Averaging	Other (10m Probe Height)
Outdoor Temperature	62101	SPM	3	☐	1	N/A	MET	017	deg C	040	Electronic Averaging	Other (2m Probe Height)
Outdoor Temperature Diff	62106	SPM	1	☐	1	N/A	MET	116	Temp Diff deg C	041	Instrumental: Elect or Mach Avg Lev 2-Lev1	Other
Oxides of Nitrogen	42603	SPM	1	☐	H	MIC	COM	008	ppb	074	Chemiluminescence	Source Oriented
PM10 - LC/FEM/NonFEM	85101	SPM	5	☐	1	MIC	COM	105	ug/m^3-LC	790	FDMS-Gravimetric 1405-DF	Source Oriented
PM2.5 - LC FRM/FEM	88101	SLAMS	4	☐	1	MIC	COM	105	ug/m^3-LC	182	FMDS-Gravimetric 1405-DF	Source Oriented
PM2.5 Tot Atmospheric	88500	SPM	1	☐	1	MIC	AQI	105	ug/m^3-LC	790	FDMS-Gravimetric 1405-DF	Source Oriented
PM2.5 Volatile Channel	88503	SPM	1	☐	1	MIC	AQI	105	ug/m^3-LC	790	FDMS-Gravimetric 1405-DF	Source Oriented
PMCoarse - LC FRM/FEM	86101	SLAMS	8	☐	1	MIC	COM	105	ug/m^3-LC	207	FMDS-Gravimetric 1405-DF	Source Oriented

Precipitation	65102	SPM	1	☐	1	N/A	MET	021	inches	014	Heated Tipping Bucket	Other
Relative Humidity	62201	SPM	1	☐	1	N/A	MET	019	%humidity	020	Instrumental-Computed (Indirect)	Other
Solar Radiation	63301	SPM	1	☐	1	N/A	MET	079	W/m^2	011	Instrumental-Pyranometer	Other
Std Dev Hz Wind Direction	61106	SPM	1	☐	1	N/A	MET	014	deg	020	Arithmetic Standard Deviation	Other (10m Tower)
UV Carbon PM2.5 LC	88314	SPM	1	☐	1	MIC	COM	105	ug/m^3-LC	894	Magee Scientific TAPI M633 Aethalometer	Source Oriented
Wind Direction - Resultant	61104	SPM	1	☐	1	N/A	MET	014	deg	065	Instrumental: RM Young Model 05305	Other (10m Tower)
Wind Speed - Resultant	61103	SPM	1	☐	1	N/A	MET	012	mph	065	Instrumental: RM Young Model 05305	Other (10m Tower)

Bonne Terre *AQS Site Number* 29-186-0005

15797 Highway D, Bonne Terre, MO 63628

Latitude: 37.90084 ***AQCR:*** 138 SE Missouri

Longitude: -90.42388 ***MSA:*** 0000 Not in a MSA

Elevation (ft): 840

Parameter	*AQS Code*	*AQS Monitor Type*	*AQS POC*	*Coll*	*AQS Freq*	*AQS Scale*	*State-Obj*	*AQS Unit-Code*	*AQS Unit*	*AQS Method Code*	*AQS Method*	*AQS Monitor Objective*

Indoor Temperature	62107	SPM	1	☐	1	N/A	MET	017	deg C	013	Electronic Averaging	Other
Ozone	44201	SLAMS	1	☐	1	REG	COM	007	ppm	047	Ultraviolet Photometric	Regional Transport
Ozone	44201	SLAMS	2	☑	1	REG	COM	007	ppm	047	Ultraviolet Photometric	-
Solar Radiation	63301	SPM	1	☐	1	N/A	MET	079	W/m^2	011	Instrumental-Pyranometer	Other

Branch Street — *AQS Site Number* 29-510-0093

100 Branch St., St. Louis, MO 63102

Latitude: 38.65643 ***AQCR:*** 070 Metropolitan St. Louis

Longitude: -90.18977 ***MSA:*** 7040 St. Louis, MO-IL

Elevation (ft): 429

Parameter	*AQS Code*	*AQS Monitor Type*	*AQS POC*	*Coll*	*AQS Freq*	*AQS Scale*	*State-Obj*	*AQS Unit-Code*	*AQS Unit*	*AQS Method Code*	*AQS Method*	*AQS Monitor Objective*
Barometric Pressure	64101	SPM	1	☐	1	N/A	MET	059	mm (Hg)	014	Instrumental-Barometric Sensor	Other
Indoor Temperature	62107	SPM	1	☐	1	N/A	MET	017	deg C	013	Electronic Averaging	Other
Outdoor Temperature	62101	SPM	1	☐	1	N/A	MET	017	deg C	040	Electronic Averaging	Other (4m Probe Height)

PM10 - STP FRM/FEM	81102	SLAMS	3	☐	1	MID	COM	001	ug/m^3	079	R&P SA246B TEOM	Source Oriented
PM2.5 - LC FRM/FEM	88101	SLAMS	4	☐	1	MID	COM	105	ug/m^3-LC	181	PM2.5 VSCC FEM or Thermo Scientific 1405-F	Source Oriented
PM2.5 Volatile Channel	88503	SPM	4	☐	1	MID	AQI	105	ug/m^3-LC	181	PM2.5 VSCC FEM or Thermo Scientific 1405-F	Source Oriented
Relative Humidity	62201	SPM	1	☐	1	N/A	MET	019	%humidity	020	Instrumental-Computed (Indirect)	Other
Std Dev Hz Wind Direction	61106	SPM	1	☐	1	N/A	MET	014	deg	020	Arithmetic Standard Deviation	Other (10m Tower)
Wind Direction - Resultant	61104	SPM	1	☐	1	N/A	MET	014	deg	065	Instrumental: RM Young Model 05305	Other (10m Tower)
Wind Speed - Resultant	61103	SPM	1	☐	1	N/A	MET	012	mph	065	Instrumental: RM Young Model 05305	Other (10m Tower)

Buick NE *AQS Site Number* 29-093-0034

346 Power Lane, Bixby West, MO 65439

Latitude: 37.65212 ***AQCR:*** 138 SE Missouri

Longitude: -91.11653 ***MSA:*** 0000 Not in a MSA

Elevation (ft): 1423

Parameter	*AQS Code*	*AQS Monitor Type*	*AQS POC*	*Coll*	*AQS Freq*	*AQS Scale*	*State-Obj*	*AQS Unit-Code*	*AQS Unit*	*AQS Method Code*	*AQS Method*	*AQS Monitor Objective*

Indoor Temperature	62107	SPM	1	☐	1	N/A	MET	017	deg C	013	Electronic Averaging	Other
Lead (TSP) - LC FRM/FEM	14129	SLAMS	1	☐	1/6	MID	COM	105	ug/m^3-LC	813	Inductively Coupled Plasma Mass Spectroscopy	Source Oriented & Highest Concentration
Lead (TSP) - LC FRM/FEM	14129	SLAMS	2	☑	1/6	MID	COM	105	ug/m^3-LC	813	Inductively Coupled Plasma Mass Spectroscopy	Quality Assurance (Collocation)
Sulfur Dioxide	42401	SPM	1	☐	H	MID	COM	008	ppb	060	Pulsed Fluorescent	Source Oriented
Sulfur Dioxide Max 5-min Avg	42406	SPM	1	☐	1	MID	COM	008	ppb	060	Pulsed Fluorescent	Source Oriented
Wind Direction - Resultant	61104	SPM	1	☐	1	N/A	MET	014	deg	065	Instrumental: RM Young Model 05305	Other (6 meters)
Wind Speed - Resultant	61103	SPM	1	☐	1	N/A	MET	012	mph	065	Instrumental: RM Young Model 05305	Other (6 meters)

Carthage — *AQS Site Number* 29-097-0003

530 Juniper, Carthage, MO 64836

Latitude: 37.19822 ***AQCR:*** 139 SW Missouri

Longitude: -94.31702 ***MSA:*** 3710 Joplin, MO

Elevation (ft): 986

Parameter	*AQS Code*	*AQS Monitor Type*	*AQS POC*	*Coll*	*AQS Freq*	*AQS Scale*	*State-Obj*	*AQS Unit-Code*	*AQS Unit*	*AQS Method Code*	*AQS Method*	*AQS Monitor Objective*

Indoor Temperature	62107	SPM	1	☐	1	N/A	MET	017	deg C	013	Electronic Averaging	Other
PM10 - STP FRM/FEM	81102	SLAMS	3	☐	1	MID	COM	001	ug/m^3	079	R&P SA246B TEOM	Source Oriented
PM10 - STP FRM/FEM	81102	SLAMS	4	☑	1	MID	COM	001	ug/m^3	079	R&P SA246B TEOM	Quality Assurance (Collocation)
Wind Direction - Resultant	61104	SPM	1	☐	1	N/A	MET	014	deg	065	Instrumental: RM Young Model 05305	Other (5.5 meters)
Wind Speed - Resultant	61103	SPM	1	☐	1	N/A	MET	012	mph	065	Instrumental: RM Young Model 05305	Other (5.5 meters)

El Dorado Springs — *AQS Site Number* 29-039-0001

Highway 97 & Barnes Road, El Dorado Springs, MO 64744

Latitude: 37.70097 ***AQCR:*** 139 SW Missouri

Longitude: -94.03474 ***MSA:*** 0000 Not in a MSA

Elevation (ft): 965

Parameter	*AQS Code*	*AQS Monitor Type*	*AQS POC*	*Coll*	*AQS Freq*	*AQS Scale*	*State-Obj*	*AQS Unit-Code*	*AQS Unit*	*AQS Method Code*	*AQS Method*	*AQS Monitor Objective*
Barometric Pressure	64101	SPM	1	☐	1	N/A	MET	059	mm (Hg)	014	Instrumental-Barometric Sensor	Other
Indoor Temperature	62107	SPM	1	☐	1	N/A	MET	017	deg C	013	Electronic Averaging	Other

Outdoor Temperature	62101	SPM	1	☐	1	N/A	MET	017	deg C	040	Electronic Averaging	Other (4m Probe Height)
Ozone	44201	SLAMS	1	☐	1	REG	COM	007	ppm	047	Ultraviolet Photometric	Regional Transport
Ozone	44201	SLAMS	2	☑	1	REG	COM	007	ppm	047	Ultraviolet Photometric	-
PM2.5 - LC FRM/FEM	88101	SLAMS	4	☐	1	REG	COM	105	ug/m^3-LC	181	PM2.5 VSCC FEM or Thermo Scientific 1405-F	Regional Transport
PM2.5 Volatile Channel	88503	SPM	4	☐	1	REG	AQI	105	ug/m^3-LC	181	PM2.5 VSCC FEM or Thermo Scientific 1405-F	Regional Transport
Relative Humidity	62201	SPM	2	☐	1	N/A	MET	019	%humidity	020	Instrumental-Computed (Indirect)	Other
Wind Direction - Resultant	61104	SPM	1	☐	1	N/A	MET	014	deg	067	Instrumental: RM Young Model 05103	Other (5.5 meters)
Wind Speed - Resultant	61103	SPM	1	☐	1	N/A	MET	012	mph	067	Instrumental: RM Young Model 05103	Other (5.5 meters)

Farrar

AQS Site Number 29-157-0001

County Rd. 342, Farrar, MO 63746

Latitude:	37.70264	***AQCR:***	138	SE Missouri
Longitude:	-89.698640	***MSA:***	0000	Not in a MSA
Elevation (ft):	497			

Parameter	*AQS Code*	*AQS Monitor Type*	*AQS POC*	*Coll*	*AQS Freq*	*AQS Scale*	*State-Obj*	*AQS Unit-Code*	*AQS Unit*	*AQS Method Code*	*AQS Method*	*AQS Monitor Objective*
Indoor Temperature	62107	SPM	1	☐	1	N/A	MET	017	deg C	013	Electronic Averaging	Other
Ozone	44201	SLAMS	1	☐	1	NBR	COM	007	ppm	047	Ultraviolet Photometric	Max Ozone Concentration & Extreme Downwind
Ozone	44201	SLAMS	2	☑	1	NBR	COM	007	ppm	047	Ultraviolet Photometric	-

Fellows Lake

AQS Site Number 29-077-0042

4208 E. Farm Rd. 66, Springfield, MO 65803

Latitude:	37.31912	***AQCR:***	139	SW Missouri
Longitude:	-93.20422	***MSA:***	7920	Springfield, MO
Elevation (ft):	1346			

Parameter	*AQS Code*	*AQS Monitor Type*	*AQS POC*	*Coll*	*AQS Freq*	*AQS Scale*	*State-Obj*	*AQS Unit-Code*	*AQS Unit*	*AQS Method Code*	*AQS Method*	*AQS Monitor Objective*
Indoor Temperature	62107	SPM	1	☐	1	N/A	MET	017	deg C	013	Electronic Averaging	Other
Ozone	44201	SLAMS	1	☐	1	URB	COM	007	ppm	047	Ultraviolet Photometric	Max Ozone Concentration & Population Exposure

Ozone	44201	SLAMS	2	☑	1	URB	COM	007	ppm	047	Ultraviolet Photometric	-

Finger Lakes — AQS Site Number 29-019-0011

1505 E. Peabody Road, Columbia, MO 65202

Latitude: 39.07803 ***AQCR:*** 137 Northern Missouri

Longitude: -92.31632 ***MSA:*** 1740 Columbia, MO

Elevation (ft): 726

Parameter	AQS Code	AQS Monitor Type	AQS POC	Coll	AQS Freq	AQS Scale	State-Obj	AQS Unit-Code	AQS Unit	AQS Method Code	AQS Method	AQS Monitor Objective
Indoor Temperature	62107	SPM	1	☐	1	N/A	MET	017	deg C	013	Electronic Averaging	Other
Ozone	44201	SLAMS	1	☐	1	NBR	COM	007	ppm	047	Ultraviolet Photometric	Max Ozone Concentration & Population Exposure
Ozone	44201	SLAMS	2	☑	1	NBR	COM	007	ppm	047	Ultraviolet Photometric	-

Fletcher — AQS Site Number 29-179-0002

Forest Rd. 2236, Westfork, MO 64498

Latitude: 37.46889 ***AQCR:*** 138 SE Missouri

Longitude: -91.08847 ***MSA:*** 0000 Not in a MSA

Elevation (ft): 1256

Parameter	AQS Code	AQS Monitor Type	AQS POC	Coll	AQS Freq	AQS Scale	State-Obj	AQS Unit-Code	AQS Unit	AQS Method Code	AQS Method	AQS Monitor Objective
Lead (TSP) - LC FRM/FEM	14129	SLAMS	1	☐	1/6	NBR	COM	105	ug/m^3-LC	813	Inductively Coupled Plasma Mass Spectroscopy	Source Oriented

Foley West — *AQS Site Number* 29-113-0004

2100 Highway Y Foley, MO 63347

Latitude: 39.04577 ***AQCR:*** 137 Northern Missouri

Longitude: -90.84927 ***MSA:*** 7040 St. Louis, MO-IL

Elevation (ft): 715

Parameter	*AQS Code*	*AQS Monitor Type*	*AQS POC*	*Coll*	*AQS Freq*	*AQS Scale*	*State-Obj*	*AQS Unit-Code*	*AQS Unit*	*AQS Method Code*	*AQS Method*	*AQS Monitor Objective*
Indoor Temperature	62107	SPM	1	☐	1	N/A	MET	017	deg C	013	Electronic Averaging	Other
Ozone	44201	SLAMS	1	☐	1	NBR	COM	007	ppm	047	Ultraviolet Photometric	Extreme Downwind
Ozone	44201	SLAMS	2	☑	1	NBR	COM	007	ppm	047	Ultraviolet Photometric	-

Forest City, Exide Levee — *AQS Site Number* 29-087-0008

25942 Hwy 111, Forest City, MO 64451

Latitude: 40.027222 ***AQCR:*** 137 Northern Missouri

Longitude: -95.235833 ***MSA:*** 0000 Not in a MSA

Elevation (ft): 904

Parameter	*AQS Code*	*AQS Monitor Type*	*AQS POC*	*Coll*	*AQS Freq*	*AQS Scale*	*State-Obj*	*AQS Unit-Code*	*AQS Unit*	*AQS Method Code*	*AQS Method*	*AQS Monitor Objective*
Lead (TSP) - LC FRM/FEM	14129	SLAMS	1	☐	1/6	MID	COM	105	ug/m^3-LC	813	Inductively Coupled Plasma Mass Spectroscopy	Source Oriented

Forest Park — AQS Site Number 29-510-0094

5600 Clayton Avenue, St. Louis, MO 63110

Latitude: 38.63114 **AQCR:** 070 Metropolitan St. Louis

Longitude: -90.28115 **MSA:** 7040 St. Louis, MO-IL

Elevation (ft): 551

Parameter	AQS Code	AQS Monitor Type	AQS POC	Coll	AQS Freq	AQS Scale	State-Obj	AQS Unit-Code	AQS Unit	AQS Method Code	AQS Method	AQS Monitor Objective
Barometric Pressure	64101	SPM	1	☐	1	N/A	MET	059	mm (Hg)	014	Instrumental-Barometric Sensor	Other
Black Carbon PM2.5 LC	88313	SPM	1	☐	1	MIC	COM	105	ug/m^3-LC	894	Magee Scientific TAPI M633 Aethalometer	Source Oriented
Carbon Monoxide	42101	SLAMS	1	☐	H	MIC	COM	007	ppm	554	Gas Filter Corr Thermo Electron 48i TLE	Source Oriented
Indoor Temperature	62107	SPM	1	☐	1	N/A	MET	017	deg C	013	Electronic Averaging	Other
Nitric Oxide	42601	SPM	1	☐	H	MIC	COM	008	ppb	074	Chemiluminescence	Source Oriented
Nitrogen Dioxide	42602	SLAMS	1	☐	H	MIC	COM	008	ppb	074	Chemiluminescence	Source Oriented
Outdoor Temperature	62101	SPM	1	☐	1	N/A	MET	017	deg C	040	Electronic Averaging	Other (4m Probe Height)

Outdoor Temperature	62101	SPM	2	☐	1	N/A	MET	017	deg C	040	Electronic Averaging	Other (10m Probe Height)
Outdoor Temperature	62101	SPM	3	☐	1	N/A	MET	017	deg C	040	Electronic Averaging	Other (2m Probe Height)
Outdoor Temperature Diff	62106	SPM	1	☐	1	N/A	MET	116	Temp Diff deg C	041	Instrumental: Elect or Mach Avg Lev 2-Lev1	Other (10m - 2m Probe Height)
Oxides of Nitrogen	42603	SPM	1	☐	H	MIC	COM	008	ppb	074	Chemiluminescence	Source Oriented
PM10 - LC/FEM/NonFEM	85101	SPM	5	☐	1	MIC	COM	105	ug/m^3-LC	790	FDMS-Gravimetric 1405-DF	Source Oriented
PM2.5 - LC FRM/FEM	88101	SLAMS	4	☐	1	MIC	COM	105	ug/m^3-LC	182	FMDS-Gravimetric 1405-DF	Source Oriented
PM2.5 Tot Atmospheric	88500	SPM	1	☐	1	MIC	AQI	105	ug/m^3-LC	790	FDMS-Gravimetric 1405-DF	Source Oriented
PM2.5 Volatile Channel	88503	SPM	1	☐	1	MIC	AQI	105	ug/m^3-LC	790	FDMS-Gravimetric 1405-DF	Source Oriented
PMCoarse - LC FRM/FEM	86101	SLAMS	8	☐	1	MIC	COM	105	ug/m^3-LC	207	FMDS-Gravimetric 1405-DF	Source Oriented

Precipitation	65102	SPM	1	☐	1	N/A	MET	021	inches	014	Heated Tipping Bucket	Other
Relative Humidity	62201	SPM	1	☐	1	N/A	MET	019	%humidity	020	Instrumental-Computed (Indirect)	Other
Solar Radiation	63301	SLAMS	1	☐	1	N/A	MET	079	W/m^2	011	Instrumental-Pyranometer	Other
Std Dev Hz Wind Direction	61106	SPM	1	☐	1	N/A	MET	014	deg	020	Arithmetic Standard Deviation	Other (10m Tower)
UV Carbon PM2.5 LC	88314	SPM	1	☐	1	MIC	COM	105	ug/m^3-LC	894	Magee Scientific TAPI M633 Aethalometer	Source Oriented
Wind Direction - Resultant	61104	SPM	1	☐	1	N/A	MET	014	deg	065	Instrumental: RM Young Model 05305	Other (10m Tower)
Wind Speed - Resultant	61103	SPM	1	☐	1	N/A	MET	012	mph	065	Instrumental: RM Young Model 05305	Other (10m Tower)

Front Street — *AQS Site Number* 29-095-0018

1331 N. Jackson, Kansas City, MO 64120

Latitude: 39.13198 ***AQCR:*** 094 Metropolitan Kansas City

Longitude: -94.53128 ***MSA:*** 3760 Kansas City, MO-KS

Elevation (ft): 728

Parameter	*AQS Code*	*AQS Monitor Type*	*AQS POC*	*Coll*	*AQS Freq*	*AQS Scale*	*State-Obj*	*AQS Unit-Code*	*AQS Unit*	*AQS Method Code*	*AQS Method*	*AQS Monitor Objective*

Indoor Temperature	62107	SPM	1	☐	1	N/A	MET	017	deg C	013	Electronic Averaging	Other
PM10 - STP FRM/FEM	81102	SLAMS	3	☐	1	NBR	COM	001	ug/m^3	079	R&P SA246B TEOM	Highest Concentration & Population Exposure

Herculaneum, Dunklin High School (Combined) — *AQS Site Number* 29-099-0005

1 Black Cat Dr., Herculaneum, MO, 63048

Latitude: 38.26703 ***AQCR:*** 070 Metropolitan St. Louis

Longitude: -90.37875 ***MSA:*** 7040 St. Louis, MO-IL

Elevation (ft): 445

Parameter	*AQS Code*	*AQS Monitor Type*	*AQS POC*	*Coll*	*AQS Freq*	*AQS Scale*	*State-Obj*	*AQS Unit-Code*	*AQS Unit*	*AQS Method Code*	*AQS Method*	*AQS Monitor Objective*
Lead (TSP) - LC FRM/FEM	14129	SLAMS	1	☐	1/6	NBR	COM	105	ug/m^3-LC	813	Inductively Coupled Plasma Mass Spectroscopy	Source Oriented

Herculaneum, Mott Street — *AQS Site Number* 29-099-0027

747 Mott St., Herculaneum, MO, 63048

Latitude: 38.263394 ***AQCR:*** 070 Metropolitan St. Louis

Longitude: -90.379667 ***MSA:*** 7040 St. Louis, MO-IL

Elevation (ft): 468

Parameter	*AQS Code*	*AQS Monitor Type*	*AQS POC*	*Coll*	*AQS Freq*	*AQS Scale*	*State-Obj*	*AQS Unit-Code*	*AQS Unit*	*AQS Method Code*	*AQS Method*	*AQS Monitor Objective*
Indoor Temperature	62107	SPM	1	☐	1	N/A	MET	017	deg C	013	Electronic Averaging	Other
Lead (TSP) - LC FRM/FEM	14129	SLAMS	1	☐	1/1	MID	COM	105	ug/m^3-LC	813	Inductively Coupled Plasma Mass Spectroscopy	Source Oriented & Highest Concentration

Lead (TSP) - LC FRM/FEM	14129	SLAMS	2	☑	1/3	MID	COM	105	ug/m^3-LC	813	Inductively Coupled Plasma Mass Spectroscopy	Quality Assurance (Collocation)
Sulfur Dioxide	42401	SLAMS	1	☐	H	MID	COM	008	ppb	060	Pulsed Fluorescent	Source Oriented & Highest Concentration
Sulfur Dioxide Max 5-min Avg	42406	SPM	1	☐	1	MID	COM	008	ppb	060	Pulsed Fluorescent	Source Oriented & Highest Concentration
Wind Direction - Resultant	61104	SPM	1	☐	1	N/A	MET	014	deg	067	Instrumental: RM Young Model 05103	Other (5.5 meters)
Wind Speed - Resultant	61103	SPM	1	☐	1	N/A	MET	012	mph	067	Instrumental: RM Young Model 05103	Other (5.5 meters)

Herculaneum, Sherman — *AQS Site Number* **29-099-0013**

460 Sherman St., Herculaneum, MO, 63048

Latitude: 38.27170 ***AQCR:*** 070 Metropolitan St. Louis

Longitude: -90.37658 ***MSA:*** 7040 St. Louis, MO-IL

Elevation (ft): 462

Parameter	*AQS Code*	*AQS Monitor Type*	*AQS POC*	*Coll*	*AQS Freq*	*AQS Scale*	*State-Obj*	*AQS Unit-Code*	*AQS Unit*	*AQS Method Code*	*AQS Method*	*AQS Monitor Objective*
Lead (TSP) - LC FRM/FEM	14129	SLAMS	1	☐	1/6	NBR	COM	105	ug/m^3-LC	813	Inductively Coupled Plasma Mass Spectroscopy	Source Oriented

Hillcrest High School

AQS Site Number 29-077-0036

3319 N. Grant, Springfield, MO 65803

Latitude: 37.25607 ***AQCR:*** 139 SW Missouri

Longitude: -93.29970 ***MSA:*** 7920 Springfield, MO

Elevation (ft): 1321

Parameter	AQS Code	AQS Monitor Type	AQS POC	Coll	AQS Freq	AQS Scale	State-Obj	AQS Unit-Code	AQS Unit	AQS Method Code	AQS Method	AQS Monitor Objective
Barometric Pressure	64101	SPM	1	☐	1	N/A	MET	059	mm (Hg)	014	Instrumental-Barometric Sensor	Other
Indoor Temperature	62107	SPM	1	☐	1	N/A	MET	017	deg C	013	Electronic Averaging	Other
Outdoor Temperature	62101	SPM	1	☐	1	N/A	MET	017	deg C	040	Electronic Averaging	Other (4m Probe Height)
Ozone	44201	SLAMS	1	☐	1	URB	COM	007	ppm	047	Ultraviolet Photometric	Population Exposure
Ozone	44201	SLAMS	2	☑	1	URB	COM	007	ppm	047	Ultraviolet Photometric	-
PM10 - LC/FEM/NonFEM	85101	SPM	5	☐	1	NBR	COM	105	ug/m^3-LC	790	FDMS-Gravimetric 1405-DF	Population Exposure
PM10 - STP FRM/FEM	81102	SLAMS	3	☐	1	NBR	COM	001	ug/m^3	079	R&P SA246B TEOM	Population Exposure

PM2.5 - LC FRM/FEM	88101	SLAMS	4	☐	1	NBR	COM	105	ug/m^3-LC	182	FMDS-Gravimetric 1405-DF	Population Exposure
PM2.5 Tot Atmospheric	88500	APM	1	☐	H	NBR	AQI	105	ug/m^3-LC	790	FDMS-Gravimetric 1405-DF	Population Exposure
PM2.5 Tot Atmospheric	88500	SPM	1	☐	1	NBR	AQI	105	ug/m^3-LC	790	FDMS-Gravimetric 1405-DF	Population Exposure
PM2.5 Volatile Channel	88503	SPM	1	☐	1	NBR	AQI	105	ug/m^3-LC	790	FDMS-Gravimetric 1405-DF	Population Exposure
Relative Humidity	62201	SPM	1	☐	1	N/A	MET	019	%humidity	020	Instrumental-Computed (Indirect)	Other

Ladue — *AQS Site Number* 29-189-3001

73 Hunter Ave., Ladue, MO 63124

Latitude: 38.65028 ***AQCR:*** 070 Metropolitan St. Louis

Longitude: -90.35021 ***MSA:*** 7040 St. Louis, MO-IL

Elevation (ft): 511

Parameter	*AQS Code*	*AQS Monitor Type*	*AQS POC*	*Coll*	*AQS Freq*	*AQS Scale*	*State-Obj*	*AQS Unit-Code*	*AQS Unit*	*AQS Method Code*	*AQS Method*	*AQS Monitor Objective*
Barometric Pressure	64101	SPM	1	☐	1	N/A	MET	059	mm (Hg)	014	Instrumental-Barometric Sensor	Other
Indoor Temperature	62107	SPM	1	☐	1	N/A	MET	017	deg C	013	Electronic Averaging	Other

Outdoor Temperature	62101	SPM	1	☐	1	N/A	MET	017	deg C	040	Electronic Averaging	Other (4m Probe Height)
PM2.5 - LC FRM/FEM	88101	SLAMS	2	☑	1/6	NBR	COM	105	ug/m^3-LC	145	R&P 2025 Sequential w/VSCC	Quality Assurance (Collocation)
PM2.5 - LC FRM/FEM	88101	SLAMS	4	☐	1	NBR	COM	105	ug/m^3-LC	181	PM2.5 VSCC FEM or Thermo Scientific 1405-F	Population Exposure
PM2.5 Volatile Channel	88503	SLAMS	4	☐	1	NBR	COM	105	ug/m^3-LC	181	PM2.5 VSCC FEM or Thermo Scientific 1405-F	Population Exposure
Relative Humidity	62201	SPM	1	☐	1	N/A	MET	019	%humidity	020	Instrumental-Computed (Indirect)	Other

Liberty — *AQS Site Number* 29-047-0005

Highway 33 & County Home Rd., Liberty, MO 64068

Latitude: 39.30314 ***AQCR:*** 094 Metropolitan Kansas City

Longitude: -94.37678 ***MSA:*** 3760 Kansas City, MO-KS

Elevation (ft): 941

Parameter	*AQS Code*	*AQS Monitor Type*	*AQS POC*	*Coll*	*AQS Freq*	*AQS Scale*	*State-Obj*	*AQS Unit-Code*	*AQS Unit*	*AQS Method Code*	*AQS Method*	*AQS Monitor Objective*
Barometric Pressure	64101	SPM	1	☐	1	N/A	MET	059	mm (Hg)	014	Instrumental-Barometric Sensor	Other
Indoor Temperature	62107	SPM	1	☐	1	N/A	MET	017	deg C	013	Electronic Averaging	Other

Outdoor Temperature	62101	SPM	1	☐	1	N/A	MET	017	deg C	040	Electronic Averaging	Other (4m Probe Height)
Ozone	44201	SLAMS	1	☐	1	NBR	COM	007	ppm	047	Ultraviolet Photometric	Population Exposure
Ozone	44201	SLAMS	2	☑	1	NBR	COM	007	ppm	047	Ultraviolet Photometric	-
PM10 - LC/FEM/NonFEM	85101	SPM	5	☐	1	NBR	COM	105	ug/m^3-LC	790	FDMS-Gravimetric 1405-DF	Population Exposure
PM2.5 - LC FRM/FEM	88101	SLAMS	4	☐	1	NBR	COM	105	ug/m^3-LC	182	FMDS-Gravimetric 1405-DF	Population Exposure
PM2.5 Tot Atmospheric	88500	SPM	1	☐	1	NBR	AQI	105	ug/m^3-LC	790	FDMS-Gravimetric 1405-DF	Population Exposure
PM2.5 Volatile Channel	88503	SPM	1	☐	1	NBR	AQI	105	ug/m^3-LC	790	FDMS-Gravimetric 1405-DF	Population Exposure
Relative Humidity	62201	SPM	1	☐	1	N/A	MET	019	%humidity	020	Instrumental-Computed (Indirect)	Other
Solar Radiation	63301	SPM	1	☐	1	N/A	MET	079	W/m^2	011	Instrumental-Pyranometer	Other

Mark Twain State Park

AQS Site Number 29-137-0001

20057 State Park Office Rd., Stoutsville, MO 65283

Latitude: 39.47510 ***AQCR:*** 137 Northern Missouri

Longitude: -91.78899 ***MSA:*** 0000 Not in a MSA

Elevation (ft): 710

Parameter	AQS Code	AQS Monitor Type	AQS POC	Coll	AQS Freq	AQS Scale	State-Obj	AQS Unit-Code	AQS Unit	AQS Method Code	AQS Method	AQS Monitor Objective
Indoor Temperature	62107	SPM	1	☐	1	N/A	MET	017	deg C	013	Electronic Averaging	Other
Nitric Oxide	42601	SPM	1	☐	H	REG	COM	008	ppb	074	Chemiluminescence	General/Background
Nitrogen Dioxide	42602	SPM	1	☐	H	REG	COM	008	ppb	074	Chemiluminescence	General/Background
Oxides of Nitrogen	42603	SPM	1	☐	H	REG	COM	008	ppb	074	Chemiluminescence	General/Background
Ozone	44201	SLAMS	1	☐	1	REG	COM	007	ppm	047	Ultraviolet Photometric	General/Background
Ozone	44201	SLAMS	2	☑	1	REG	COM	007	ppm	047	Ultraviolet Photometric	-
PM10 - STP FRM/FEM	81102	SPM	3	☐	1	REG	SIP	001	ug/m^3	079	R&P SA246B TEOM	General/Background

Sulfur Dioxide	42401	SPM	1	☐	H	REG	SIP	008	ppb	060	Pulsed Fluorescent	General/Background
Sulfur Dioxide Max 5-min Avg	42406	SPM	1	☐	1	NBR	COM	008	ppb	060	Pulsed Fluorescent	General/Background
Wind Direction - Resultant	61104	SPM	1	☐	1	N/A	MET	014	deg	065	Instrumental: RM Young Model 05305	Other (10m Tower)
Wind Speed - Resultant	61103	SPM	1	☐	1	N/A	MET	012	mph	065	Instrumental: RM Young Model 05305	Other (10m Tower)

Maryland Heights — *AQS Site Number* 29-189-0014

13044 Marine Ave., Maryland Heights, MO 63146

Latitude: 38.71085 ***AQCR:*** 070 Metropolitan St. Louis

Longitude: -90.47606 ***MSA:*** 7040 St. Louis, MO-IL

Elevation (ft): 607

Parameter	*AQS Code*	*AQS Monitor Type*	*AQS POC*	*Coll*	*AQS Freq*	*AQS Scale*	*State-Obj*	*AQS Unit-Code*	*AQS Unit*	*AQS Method Code*	*AQS Method*	*AQS Monitor Objective*
Indoor Temperature	62107	SPM	1	☐	1	N/A	MET	017	deg C	013	Electronic Averaging	Other
Ozone	44201	SLAMS	1	☐	1	NBR	COM	007	ppm	047	Ultraviolet Photometric	Population Exposure
Ozone	44201	SLAMS	2	☑	1	NBR	COM	007	ppm	047	Ultraviolet Photometric	-

New Bloomfield — *AQS Site Number* 29-027-0002

2625 Meadow Lake View, New Bloomfield, MO, 65063

Latitude: 38.70608 ***AQCR:*** 137 Northern Missouri

Longitude: -92.09308 ***MSA:*** 0000 Not in a MSA

Elevation (ft): 860

Parameter	*AQS Code*	*AQS Monitor Type*	*AQS POC*	*Coll*	*AQS Freq*	*AQS Scale*	*State-Obj*	*AQS Unit-Code*	*AQS Unit*	*AQS Method Code*	*AQS Method*	*AQS Monitor Objective*
Indoor Temperature	62107	SPM	1	☐	1	N/A	MET	017	deg C	013	Electronic Averaging	Other
Ozone	44201	SLAMS	1	☐	1	NBR	COM	007	ppm	047	Ultraviolet Photometric	Max Ozone Concentration & Population Exposure
Ozone	44201	SLAMS	2	☑	1	NBR	COM	007	ppm	047	Ultraviolet Photometric	-

Oates — *AQS Site Number* 29-179-0034

13155 Highway KK, Boss, MO 65440

Latitude: 37.56485 ***AQCR:*** 138 SE Missouri

Longitude: -91.11423 ***MSA:*** 0000 Not in a MSA

Elevation (ft): 1134

Parameter	*AQS Code*	*AQS Monitor Type*	*AQS POC*	*Coll*	*AQS Freq*	*AQS Scale*	*State-Obj*	*AQS Unit-Code*	*AQS Unit*	*AQS Method Code*	*AQS Method*	*AQS Monitor Objective*
Lead (TSP) - LC FRM/FEM	14129	SLAMS	1	☐	1/6	NBR	COM	105	ug/m^3-LC	813	Inductively Coupled Plasma Mass Spectroscopy	Source Oriented

Orchard Farm — AQS Site Number 29-183-1004

2165 Highway V, St. Charles, MO 63301

Latitude: 38.8994 **AQCR:** 070 Metropolitan St. Louis

Longitude: -90.44917 **MSA:** 7040 St. Louis, MO-IL

Elevation (ft): 441

Parameter	AQS Code	AQS Monitor Type	AQS POC	Coll	AQS Freq	AQS Scale	State-Obj	AQS Unit-Code	AQS Unit	AQS Method Code	AQS Method	AQS Monitor Objective
Indoor Temperature	62107	SPM	1	☐	1	N/A	MET	017	deg C	013	Electronic Averaging	Other
Ozone	44201	SLAMS	1	☐	1	URB	COM	007	ppm	047	Ultraviolet Photometric	Extreme Downwind
Ozone	44201	SLAMS	2	☑	1	URB	COM	007	ppm	047	Ultraviolet Photometric	-

Pacific — AQS Site Number 29-189-0005

18701 Old Highway 66, Pacific, MO 63069

Latitude: 38.49011 **AQCR:** 070 Metropolitan St. Louis

Longitude: -90.70509 **MSA:** 7040 St. Louis, MO-IL

Elevation (ft): 524

Parameter	AQS Code	AQS Monitor Type	AQS POC	Coll	AQS Freq	AQS Scale	State-Obj	AQS Unit-Code	AQS Unit	AQS Method Code	AQS Method	AQS Monitor Objective
Indoor Temperature	62107	SPM	1	☐	1	N/A	MET	017	deg C	013	Electronic Averaging	Other
Ozone	44201	SLAMS	1	☐	1	NBR	COM	007	ppm	047	Ultraviolet Photometric	Population Exposure

Ozone	44201	SLAMS	2	☑	1	NBR	COM	007	ppm	047	Ultraviolet Photometric	-

Richards Gebaur-South — *AQS Site Number* 29-037-0003

1802 E. 203rd Street, Belton, MO, 64012

Latitude: 38.75961 ***AQCR:*** 094 Metropolitan Kansas City

Longitude: -94.57983 ***MSA:*** 3760 Kansas City, MO-KS

Elevation (ft): 1082

Parameter	*AQS Code*	*AQS Monitor Type*	*AQS POC*	*Coll*	*AQS Freq*	*AQS Scale*	*State-Obj*	*AQS Unit-Code*	*AQS Unit*	*AQS Method Code*	*AQS Method*	*AQS Monitor Objective*
Barometric Pressure	64101	SPM	1	☐	1	N/A	MET	059	mm (Hg)	014	Instrumental-Barometric Sensor	Other
Indoor Temperature	62107	SPM	1	☐	1	N/A	MET	017	deg C	013	Electronic Averaging	Other
Outdoor Temperature	62101	SPM	1	☐	1	N/A	MET	017	deg C	040	Electronic Averaging	Other (4m Probe Height)
Ozone	44201	SLAMS	1	☐	1	NBR	COM	007	ppm	047	Ultraviolet Photometric	Population Exposure
Ozone	44201	SLAMS	2	☑	1	NBR	COM	007	ppm	047	Ultraviolet Photometric	-
PM10 - LC/FEM/NonFEM	85101	SPM	5	☐	1	NBR	COM	105	ug/m^3-LC	790	FDMS-Gravimetric 1405-DF	Population Exposure

PM2.5 - LC FRM/FEM	88101	SLAMS	4	☐	1	NBR	COM	105	ug/m^3-LC	182	FMDS-Gravimetric 1405-DF	Population Exposure
PM2.5 Tot Atmospheric	88500	SPM	1	☐	1	NBR	AQI	105	ug/m^3-LC	790	FDMS-Gravimetric 1405-DF	Population Exposure
PM2.5 Volatile Channel	88503	SPM	1	☐	1	NBR	AQI	105	ug/m^3-LC	790	FDMS-Gravimetric 1405-DF	Population Exposure
Relative Humidity	62201	SPM	1	☐	1	N/A	MET	019	%humidity	020	Instrumental-Computed (Indirect)	Other
Wind Direction - Resultant	61104	SPM	1	☐	1	N/A	MET	014	deg	067	Instrumental: RM Young Model 05103	Other (10m Tower)
Wind Speed - Resultant	61103	SPM	1	☐	1	N/A	MET	012	mph	067	Instrumental: RM Young Model 05103	Other (10m Tower)

Rider Trail, I-70 — *AQS Site Number* 29-189-0016

13080 Hollenberg Drive, Bridgeton, MO 63044

Latitude: 38.75264 ***AQCR:*** 070 Metropolitan St. Louis

Longitude: -90.44884 ***MSA:*** 7040 St. Louis, MO-IL

Elevation (ft): 515

Parameter	*AQS Code*	*AQS Monitor Type*	*AQS POC*	*Coll*	*AQS Freq*	*AQS Scale*	*State-Obj*	*AQS Unit-Code*	*AQS Unit*	*AQS Method Code*	*AQS Method*	*AQS Monitor Objective*
Barometric Pressure	64101	SPM	1	☐	1	N/A	MET	059	mm (Hg)	014	Instrumental-Barometric Sensor	Other

Indoor Temperature	62107	SPM	1	☐	1	N/A	MET	017	deg C	013	Electronic Averaging	Other
Nitric Oxide	42601	SPM	1	☐	H	MIC	COM	008	ppb	074	Chemiluminescence	Source Oriented
Nitrogen Dioxide	42602	SLAMS	1	☐	H	MIC	COM	008	ppb	074	Chemiluminescence	Source Oriented
Outdoor Temperature	62101	SPM	2	☐	1	N/A	MET	017	deg C	040	Electronic Averaging	Other (10m Probe Height)
Outdoor Temperature	62101	SPM	3	☐	1	N/A	MET	017	deg C	040	Electronic Averaging	Other (2m Probe Height)
Outdoor Temperature Diff	62106	SPM	1	☐	1	N/A	MET	116	Temp Diff deg C	041	Instrumental: Elect or Mach Avg Lev 2-Lev1	Other (10m - 2m Probe Height)
Oxides of Nitrogen	42603	SPM	1	☐	H	MIC	COM	008	ppb	074	Chemiluminescence	Source Oriented
Precipitation	65102	SPM	1	☐	1	N/A	MET	021	inches	014	Heated Tipping Bucket	Other
Relative Humidity	62201	SPM	1	☐	1	N/A	MET	019	%humidity	020	Instrumental-Computed (Indirect)	Other

Solar Radiation	63301	SPM	1	☐	1	N/A	MET	079	W/m^2	011	Instrumental-Pyranometer	Other
Std Dev Hz Wind Direction	61106	SPM	1	☐	1	N/A	MET	014	deg	020	Arithmetic Standard Deviation	Other (10m Tower)
Sulfur Dioxide	42401	SPM	1	☐	H	MID	SPP	008	ppb	060	Pulsed Fluorescent	Population Exposure
Sulfur Dioxide Max 5-min Avg	42406	SPM	1	☐	1	MID	SPP	008	ppb	060	Pulsed Fluorescent	Population Exposure
Wind Direction - Resultant	61104	SPM	1	☐	1	N/A	MET	014	deg	065	Instrumental: RM Young Model 05305	Other (10m Tower)
Wind Speed - Resultant	61103	SPM	1	☐	1	N/A	MET	012	mph	065	Instrumental: RM Young Model 05305	Other (10m Tower)

Rocky Creek — *AQS Site Number* 29-047-0006

2-114 NW 132 St., Kansas City, MO 64165

Latitude: 39.33188 ***AQCR:*** 094 Metropolitan Kansas City

Longitude: -94.58069 ***MSA:*** 3760 Kansas City, MO-KS

Elevation (ft): 990

Parameter	*AQS Code*	*AQS Monitor Type*	*AQS POC*	*Coll*	*AQS Freq*	*AQS Scale*	*State-Obj*	*AQS Unit-Code*	*AQS Unit*	*AQS Method Code*	*AQS Method*	*AQS Monitor Objective*
Indoor Temperature	62107	SPM	1	☐	1	N/A	MET	017	deg C	013	Electronic Averaging	Other

Ozone	44201	SLAMS	1	☐	1	NBR	COM	007	ppm	047	Ultraviolet Photometric	Population Exposure
Ozone	44201	SLAMS	2	☑	1	NBR	COM	007	ppm	047	Ultraviolet Photometric	-

Savannah — *AQS Site Number* 29-003-0001

11796 Highway 71, Savannah, MO 64485

Latitude: 39.9544 ***AQCR:*** 137 Northern Missouri

Longitude: -94.849 ***MSA:*** 7000 St. Joseph, MO

Elevation (ft): 1120

Parameter	*AQS Code*	*AQS Monitor Type*	*AQS POC*	*Coll*	*AQS Freq*	*AQS Scale*	*State-Obj*	*AQS Unit-Code*	*AQS Unit*	*AQS Method Code*	*AQS Method*	*AQS Monitor Objective*
Indoor Temperature	62107	SPM	1	☐	1	N/A	MET	017	deg C	013	Electronic Averaging	Other
Ozone	44201	SLAMS	1	☐	1	NBR	COM	007	ppm	047	Ultraviolet Photometric	Population Exposure
Ozone	44201	SLAMS	2	☑	1	NBR	COM	007	ppm	047	Ultraviolet Photometric	-

South Broadway — *AQS Site Number* 29-510-0007

8227 South Broadway, St. Louis, MO 63111

Latitude: 38.5425 ***AQCR:*** 070 Metropolitan St. Louis

Longitude: -90.263611 ***MSA:*** 7040 St. Louis, MO-IL

Elevation (ft): 452

Parameter	*AQS Code*	*AQS Monitor Type*	*AQS POC*	*Coll*	*AQS Freq*	*AQS Scale*	*State-Obj*	*AQS Unit-Code*	*AQS Unit*	*AQS Method Code*	*AQS Method*	*AQS Monitor Objective*

Barometric Pressure	64101	SLAMS	1	☐	1	N/A	MET	059	mm (Hg)	014	Instrumental-Barometric Sensor	Other
Indoor Temperature	62107	SPM	1	☐	1	N/A	MET	017	deg C	013	Electronic Averaging	Other
Outdoor Temperature	62101	SPM	1	☐	1	N/A	MET	017	deg C	040	Electronic Averaging	Other (4m Probe Height)
PM2.5 - LC FRM/FEM	88101	SLAMS	4	☐	1	NBR	COM	105	ug/m^3-LC	181	PM2.5 VSCC FEM or Thermo Scientific 1405-F	Population Exposure
PM2.5 Volatile Channel	88503	SPM	4	☐	1	NBR	AQI	105	ug/m^3-LC	181	PM2.5 VSCC FEM or Thermo Scientific 1405-F	Population Exposure
Relative Humidity	62201	SPM	1	☐	1	N/A	MET	019	%humidity	020	Instrumental-Computed (Indirect)	Other

St. Joe State Park — *AQS Site Number* 29-187-0007

2800 Pimville Rd., Park Hills, MO 63601

Latitude: 37.81413 ***AQCR:*** 138 SE Missouri

Longitude: -90.50738 ***MSA:*** 0000 Not in a MSA

Elevation (ft): 937

Parameter	*AQS Code*	*AQS Monitor Type*	*AQS POC*	*Coll*	*AQS Freq*	*AQS Scale*	*State-Obj*	*AQS Unit-Code*	*AQS Unit*	*AQS Method Code*	*AQS Method*	*AQS Monitor Objective*
Lead (TSP) - LC FRM/FEM	14129	SPM	1	☐	1/6	NBR	COM	105	ug/m^3-LC	813	Inductively Coupled Plasma Mass Spectroscopy	Source Oriented

St. Joseph Pump Station

AQS Site Number 29-021-0005

S. Highway 759, St. Joseph, MO 64501

Latitude: 39.741667 ***AQCR:*** 094 Metropolitan Kansas City

Longitude: -94.858333 ***MSA:*** 7000 St. Joseph, MO

Elevation (ft): 845

Parameter	AQS Code	AQS Monitor Type	AQS POC	Coll	AQS Freq	AQS Scale	State-Obj	AQS Unit-Code	AQS Unit	AQS Method Code	AQS Method	AQS Monitor Objective
Barometric Pressure	64101	SPM	1	☐	1	N/A	MET	059	mm (Hg)	014	Instrumental-Barometric Sensor	Other
Barometric Pressure	64101	SPM	2	☑	1	N/A	MET	059	mm (Hg)	014	Instrumental-Barometric Sensor	Other
Indoor Temperature	62107	SPM	1	☐	1	N/A	MET	017	deg C	013	Electronic Averaging	Other
Outdoor Temperature	62101	SPM	1	☐	1	N/A	MET	017	deg C	040	Electronic Averaging	Other (4m Probe Height)
Outdoor Temperature	62101	SPM	2	☑	1	N/A	MET	017	deg C	040	Electronic Averaging	Other (4m Probe Height)
PM10 - LC/FEM/NonFEM	85101	SPM	5	☐	1	NBR	COM	105	ug/m^3-LC	790	FDMS-Gravimetric 1405-DF	Population Exposure
PM10 - LC/FEM/NonFEM	85101	SPM	6	☑	1	NBR	COM	105	ug/m^3-LC	790	FDMS-Gravimetric 1405-DF	Quality Assurance (Collocation)

PM10 - STP FRM/FEM	81102	SLAMS	3	☐	1	NBR	COM	001	ug/m^3	079	R&P SA246B TEOM	Population Exposure
PM2.5 - LC FRM/FEM	88101	SLAMS	4	☐	1	NBR	COM	105	ug/m^3-LC	182	FMDS-Gravimetric 1405-DF	Population Exposure
PM2.5 - LC FRM/FEM	88101	SLAMS	5	☑	1	NBR	COM	105	ug/m^3-LC	182	FMDS-Gravimetric 1405-DF	Quality Assurance (Collocation)
PM2.5 Tot Atmospheric	88500	SPM	1	☐	1	NBR	AQI	105	ug/m^3-LC	790	FDMS-Gravimetric 1405-DF	Population Exposure
PM2.5 Tot Atmospheric	88500	SPM	2	☑	1	NBR	AQI	105	ug/m^3-LC	790	FDMS-Gravimetric 1405-DF	Quality Assurance (Collocation)
PM2.5 Volatile Channel	88503	SPM	1	☐	1	NBR	AQI	105	ug/m^3-LC	790	FDMS-Gravimetric 1405-DF	Population Exposure
PM2.5 Volatile Channel	88503	SPM	2	☑	1	NBR	AQI	105	ug/m^3-LC	790	FDMS-Gravimetric 1405-DF	Quality Assurance (Collocation)
Relative Humidity	62201	SPM	1	☐	1	N/A	MET	019	%humidity	020	Instrumental-Computed (Indirect)	Other
Relative Humidity	62201	SPM	2	☑	1	N/A	MET	019	%humidity	020	Instrumental-Computed (Indirect)	Other
Wind Direction - Resultant	61104	SPM	1	☐	1	N/A	MET	014	deg	067	Instrumental: RM Young Model 05103	Other (5.5 meters)

Wind Speed - Resultant	61103	SPM	1	☐	1	N/A	MET	012	mph	067	Instrumental: RM Young Model 05103	Other (5.5 meters)

Trimble

AQS Site Number 29-049-0001

7536 SW. O Highway, Trimble, MO 64492

Latitude: 39.53063 ***AQCR:*** 137 Northern Missouri

Longitude: -94.55594 ***MSA:*** 3760 Kansas City, MO-KS

Elevation (ft): 1033

Parameter	AQS Code	AQS Monitor Type	AQS POC	Coll	AQS Freq	AQS Scale	State-Obj	AQS Unit-Code	AQS Unit	AQS Method Code	AQS Method	AQS Monitor Objective
Indoor Temperature	62107	SPM	1	☐	1	N/A	MET	017	deg C	013	Electronic Averaging	Other
Ozone	44201	SLAMS	1	☐	1	NBR	COM	007	ppm	047	Ultraviolet Photometric	Max Ozone Concentration
Ozone	44201	SLAMS	2	☑	1	NBR	COM	007	ppm	047	Ultraviolet Photometric	-

Troost

AQS Site Number 29-095-0034

724 Troost (Rear), Kansas City, MO 64106

Latitude: 39.10465 ***AQCR:*** 094 Metropolitan Kansas City

Longitude: -94.57055 ***MSA:*** 3760 Kansas City, MO-KS

Elevation (ft): 941

Parameter	AQS Code	AQS Monitor Type	AQS POC	Coll	AQS Freq	AQS Scale	State-Obj	AQS Unit-Code	AQS Unit	AQS Method Code	AQS Method	AQS Monitor Objective
Barometric Pressure	64101	SPM	1	☐	1	N/A	MET	059	mm (Hg)	014	Instrumental-Barometric Sensor	Other

Indoor Temperature	62107	SPM	1	☐	1	N/A	MET	017	deg C	013	Electronic Averaging	Other
Nitric Oxide	42601	SPM	1	☐	H	URB	COM	008	ppb	074	Chemiluminescence	Population Exposure
Nitrogen Dioxide	42602	SLAMS	1	☐	H	URB	COM	008	ppb	074	Chemiluminescence	Population Exposure
Outdoor Temperature	62101	SPM	1	☐	1	N/A	MET	017	deg C	040	Electronic Averaging	Other (4m Probe Height)
Oxides of Nitrogen	42603	SPM	1	☐	H	URB	COM	008	ppb	074	Chemiluminescence	Population Exposure
PM10 - STP FRM/FEM	81102	SPM	6	☐	H	NBR	COM	001	ug/m^3	239	Teledyne API T640x	Population Exposure
PM2.5 - LC FRM/FEM	88101	SLAMS	4	☐	H	NBR	COM	105	ug/m^3-LC	181	PM2.5 VSCC FEM or Thermo Scientific 1405-F	Population Exposure
PM2.5 - LC FRM/FEM	88101	SPM	6	☐	H	NBR	COM	105	ug/m^3-LC	238	Teledyne API T640x	Population Exposure
PM2.5 Volatile Channel	88503	SPM	4	☐	1	NBR	AQI	105	ug/m^3-LC	181	PM2.5 VSCC FEM or Thermo Scientific 1405-F	Population Exposure

Relative Humidity	62201	SPM	1	☐	1	N/A	MET	019	%humidity	020	Instrumental-Computed (Indirect)	Other
Sulfur Dioxide	42401	SLAMS	1	☐	H	MID	COM	008	ppb	060	Pulsed Fluorescent	Source Oriented
Sulfur Dioxide Max 5-min Avg	42406	SLAMS	1	☐	1	MID	COM	008	ppb	060	Pulsed Fluorescent	Source Oriented

Ursuline North — *AQS Site Number* 29-099-0025

210 Glennon Heights Rd., Crystal City, MO 63019

Latitude: 38.243 ***AQCR:*** 070 Metropolitan St. Louis

Longitude: -90.37372 ***MSA:*** 7040 St. Louis, MO-IL

Elevation (ft): 578

Parameter	*AQS Code*	*AQS Monitor Type*	*AQS POC*	*Coll*	*AQS Freq*	*AQS Scale*	*State-Obj*	*AQS Unit-Code*	*AQS Unit*	*AQS Method Code*	*AQS Method*	*AQS Monitor Objective*
Lead (TSP) - LC FRM/FEM	14129	SLAMS	1	☐	1/6	NBR	COM	105	ug/m^3-LC	813	Inductively Coupled Plasma Mass Spectroscopy	Source Oriented & Upwind Background

Watkins Mill State Park — *AQS Site Number* 29-047-0003

Watkins Mill Road, Lawson, MO 64062

Latitude: 39.407419 ***AQCR:*** 094 Metropolitan Kansas City

Longitude: -94.265142 ***MSA:*** 3760 Kansas City, MO-KS

Elevation (ft): 1009

Parameter	*AQS Code*	*AQS Monitor Type*	*AQS POC*	*Coll*	*AQS Freq*	*AQS Scale*	*State-Obj*	*AQS Unit-Code*	*AQS Unit*	*AQS Method Code*	*AQS Method*	*AQS Monitor Objective*
Indoor Temperature	62107	SPM	1	☐	1	N/A	MET	017	deg C	013	Electronic Averaging	Other

Ozone	44201	SLAMS	1	☐	1	URB	COM	007	ppm	047	Ultraviolet Photometric	Extreme Downwind
Ozone	44201	SLAMS	2	☑	1	URB	COM	007	ppm	047	Ultraviolet Photometric	-

West Alton — *AQS Site Number* 29-183-1002

General Elecric Store, Highway 94, West Alton, MO 63386

Latitude: 38.8725 ***AQCR:*** 070 Metropolitan St. Louis

Longitude: -90.226389 ***MSA:*** 7040 St. Louis, MO-IL

Elevation (ft): 425

Parameter	*AQS Code*	*AQS Monitor Type*	*AQS POC*	*Coll*	*AQS Freq*	*AQS Scale*	*State-Obj*	*AQS Unit-Code*	*AQS Unit*	*AQS Method Code*	*AQS Method*	*AQS Monitor Objective*
Indoor Temperature	62107	SPM	1	☐	1	N/A	MET	017	deg C	013	Electronic Averaging	Other
Outdoor Temperature	62101	SPM	1	☐	1	N/A	MET	017	deg C	040	Electronic Averaging	Other
Ozone	44201	SLAMS	1	☐	1	URB	COM	007	ppm	047	Ultraviolet Photometric	Max Ozone Concentration & Population Exposure
Ozone	44201	SLAMS	2	☑	1	URB	COM	007	ppm	047	Ultraviolet Photometric	-
Relative Humidity	62201	SPM	1	☐	1	N/A	MET	019	%humidity	020	Instrumental-Computed (Indirect)	Other

Solar Radiation	63301	SPM	1	☐	1	N/A	MET	079	W/m^2	011	Instrumental-Pyranometer	Other
Wind Direction - Resultant	61104	SPM	1	☐	1	N/A	MET	014	deg	067	Instrumental: RM Young Model 05103	Other (10m Tower)
Wind Speed - Resultant	61103	SPM	1	☐	1	N/A	MET	012	mph	067	Instrumental: RM Young Model 05103	Other (10m Tower)

Magnitude 7 Metals (PQAO - 2368)

Magnitude 7 Metals, Site # 1 AECI Water Tower Location

AQS Site Number 29-143-9001

391 St Jude Industrial Park, New Madrid, MO 63869

Latitude: 36.51364 ***AQCR:*** 138 SE Missouri

Longitude: -89.56093 ***MSA:*** 0000 Not in a MSA

Elevation (ft): 297

Parameter	AQS Code	AQS Monitor Type	AQS POC	Coll	AQS Freq	AQS Scale	State-Obj	AQS Unit-Code	AQS Unit	AQS Method Code	AQS Method	AQS Monitor Objective
Indoor Temperature	62107	Industrial	1	☐	1	MID	MET	017	deg C	013	Electronic Averaging	Other
Sulfur Dioxide	42401	Industrial	1	☐	H	MID	COM	008	ppb	060	Pulsed Fluorescent	Source Oriented
Sulfur Dioxide Max 5-min Avg	42406	Industrial	1	☐	1	MID	COM	008	ppb	060	Pulsed Fluorescent	Source Oriented

Magnitude 7 Metals, Site # 2 East Graveyard

AQS Site Number 29-143-9002

391 St Jude Industrial Park, New Madrid, MO 63869

Latitude: 36.50838 ***AQCR:*** 138 SE Missouri

Longitude: -89.56074 ***MSA:*** 0000 Not in a MSA

Elevation (ft): 296

Parameter	AQS Code	AQS Monitor Type	AQS POC	Coll	AQS Freq	AQS Scale	State-Obj	AQS Unit-Code	AQS Unit	AQS Method Code	AQS Method	AQS Monitor Objective
Indoor Temperature	62107	Industrial	1	☐	1	MID	MET	017	deg C	013	Electronic Averaging	Other

Sulfur Dioxide	42401	Industrial	1	☐	H	MID	COM	008	ppb	060	Pulsed Fluorescent	Source Oriented
Sulfur Dioxide Max 5-min Avg	42406	Industrial	1	☐	1	MID	COM	008	ppb	060	Pulsed Fluorescent	Source Oriented

Magnitude 7 Metals, Site # 3 West Entrance *AQS Site Number* **29-143-9003**

391 St Jude Industrial Park, New Madrid, MO 63869

Latitude: 36.50899 ***AQCR:*** 138 SE Missouri

Longitude: -89.57099 ***MSA:*** 0000 Not in a MSA

Elevation (ft): 298

Parameter	*AQS Code*	*AQS Monitor Type*	*AQS POC*	*Coll*	*AQS Freq*	*AQS Scale*	*State-Obj*	*AQS Unit-Code*	*AQS Unit*	*AQS Method Code*	*AQS Method*	*AQS Monitor Objective*
Indoor Temperature	62107	Industrial	1	☐	1	MID	MET	017	deg C	013	Electronic Averaging	Other
Sulfur Dioxide	42401	Industrial	1	☐	H	MID	COM	008	ppb	060	Pulsed Fluorescent	Source Oriented
Sulfur Dioxide Max 5-min Avg	42406	Industrial	1	☐	1	MID	COM	008	ppb	060	Pulsed Fluorescent	Source Oriented
Wind Direction - Resultant	61104	Industrial	1	☐	1	MID	MET	014	deg	065	Instrumental: RM Young Model 05305	Other
Wind Speed - Resultant	61103	Industrial	1	☐	1	MID	MET	011	m/s	065	Instrumental: RM Young Model 05305	Other